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Ophthalmic Hospital Reports

AND JOURNAL OF THE

ROYAL LONDON OPHTHALMIC HOSPITAL.

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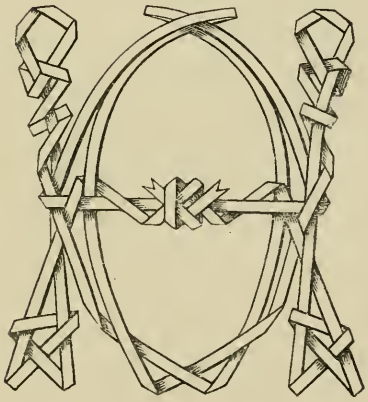

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CONTENTS

OF

THE THIRD VOLUME.

No. XIII. (Old Series).

SELECTED CASES.

PAGE

Case XXXVIII.—Plastic Operation for the formation of new eyelids, by Mr. Eccles. Case XXXIX.—Operation for the recovery of an Obliterated Punctum, by Mr. Streatfeild. Case XL.—Accidental Trichiasis of one or two lashes only, by Mr. Streatfeild 2

ORIGINAL PAPERS.

1. On the Division of the Ciliary muscle in Glaucoma, by Mr. Hancock 13
2. Paralytic Affections of the Muscles of the Eye (*concluded*), by John S. Wells 21

PERISCOPE OF FOREIGN OPHTHALMOLOGY.

Abstract of Müller's paper on Diseases of the Choroid, Vitreous, and Retina in Morbus Brightii, etc..... 50

VARIOUS OBSERVATIONS.

Diagrams in outline, for reports of Cases, by Mr. Streatfeild 61
A hospital chair for patients in Ophthalmoscopy, by ditto. 64
Dislocations of the Lens, by Dr. Wilson 65
Clinical and Anatomical Observations, by J. W. Hulke .. 69

SELECTED CASES.

PAGE

Case XLI.—Fibro-calcareous growth from the wall of the orbit, by Dr. Bader. Case XLII.—Scars of the Choroid after Traumatic Rupture, by Dr. Frank. Case XLIII.—Peculiar appearance of the optic nerve entrance, by Dr. Frank 80

ORIGINAL PAPERS.

On the Causes of the Apparent Motions of the Images of Objects situated in different planes within the Eye, when viewed by means of the Ophthalmoscope, etc., by Dr. Rainy 91

PERISCOPE OF FOREIGN OPHTHALMOLOGY.

Abstract of Donders' Hints as to the Use and Choice of Spectacles, and of v. Graefe's Therapeutic Miscellanies.. 107
Notice to Subscribers 135

No. I. (No. XIV. Old Series).

Part I.—ORIGINAL CONTRIBUTIONS.

1. G. Critchett, Practical Observations on Congenital Cataract 137
2. J. W. Hulke, Practical Remarks on some Diseases of the Frontal Sinus 147

Part II.—REVIEWS.

1. Congenital Diseases and Malformations of the Dioptric Media, by W. R. Wilde, M.D. 155
2. On Intra-ocular Myotomy in Myopia, by Vose Solomon 156
3. Die Auslöffelung des Staars. Ein neues Verfahren. (The out-scooping of Cataract. A new proceeding). Von Dr. Med. Adolf Schuft 159

PART III.—PERISCOPE.

PAGE

1. Donders' Contributions to the knowledge of the Anomalies of Refraction and Accommodation, by J. S. WELLS 163

PART IV.—MINOR CONTRIBUTIONS, ETC.

1. Case of Remarkable Blood-Effusion into the Lamellated Cornea, following a Wound, reported by J. S. WELLS 171
2. Iridectomy in Iritic and Choroidal Inflammation, and in certain forms of Corneitis, by J. W. HULKE 172
3. A Catalogue of the Ophthalmoscopic Drawings in the Library of the Royal London Ophthalmic Hospital, by DR. C. BADER, Curator 175

No. II. (No. XV. Old Series).

PART I.—ORIGINAL CONTRIBUTIONS.

1. G. CRITCHETT, Practical Remarks on Congenital Cataract (*Continued from page* 147) 183
2. J. W. HULKE, On the Epithelium of the Choroid 196
3. A. POLAND, On the Injuries of the Eye, considered from a Medico-legal point of view 198

PART II.—REVIEWS.

1. On the Employment of Metallic and Glass Shields in the treatment of Symblepharon, by J. C. WORDSWORTH .. 216
2. On a new and peculiar treatment of Trichiasis and Entropium, by Dr. WILLIAMS..... 219

PART III.—PERISCOPE.

1. Donders on Anomalies of Refraction and Accommodation, by J. S. WELLS 220
2. Graefe on a new mode of operation in desperate cases of Chronic *Iritis* and Irido-cyclitis, by J. S. WELLS 224

PART IV.—MINOR CONTRIBUTIONS, ETC.

PAGE

1. Case of Irido-Choroiditis, illustrative of the beneficial effect of repeated Iridectomies, reported by J. S. WELLS 230
2. A case of Pulsating Tumour of the Orbit, for which the common Carotid Artery was tied, reported by FRANCIS MASON 234
3. Cases of Congenital Cataract treated by Gibson's Operation, by J. W. HULKE 239
4. Cases illustrative of various forms of Mutilation of the Field of Vision, by J. W. HULKE 242
5. A Catalogue of the Ophthalmoscopic Drawings in the Library of the Royal London Ophthalmic Hospital, by Dr. C. BADER, Curator 249

No. III. (No. XVI. Old Series).

PART I.—ORIGINAL CONTRIBUTIONS.

1. T. PRIDGIN TEALE, Jun., On the Relief of Symblepharon by Transplantation of Conjunctiva 253
2. A. POLAND, On the Injuries of the Eye, considered from a Medico-legal point of view. (*Continued from page* 215) 259

PART II.—REVIEWS.

1. On the Use of Forceps in Extraction of Cataract; France's Method, by A. POLAND 268
2. On the Action of Santonine on Vision, and its Causes, by Mr. FRANCESCHI. 270

PART III.—MINOR CONTRIBUTIONS, ETC.

1. Case of Congenital Absence of the Iris in both Eyes, reported by GEORGE LAWSON 272
2. Dissection of the Ciliary region in a case where Iridectomy had been performed, by J. W. HULKE 273

PAGE

3. Acute Choroiditis, effusion of Serum and Blood stripping the Retina from the Choroid; with Rupture of the coarcted Retina near the Foramen Opticum, by ditto. 274
4. Case of Choroiditis from a penetrating wound. Formation of Connective Tissue and Blood-vessels in the Vitreous Humour, by ditto. 276
5. A series of cases of Carcinoma of the Eyeball, by ditto. 279
6. Cases of Reflex (?) Amaurosis with Coloured Vision, by J. Hughlings Jackson, M.D. 286
7. Cases which refer to the Ophthalmoscopic Drawings of Group V. by Dr. C. Bader, Curator 291

No. IV. (No. XVII. Old Series).

Part I.—ORIGINAL CONTRIBUTIONS.

1. J. C. Wordsworth, Gonorrhœal Inflammation of the Eyeball 301
2. Mr. Streatfeild, On the Use of Atropine-Paper 310
3. Soelberg Wells, The Beneficial Effect of the Insufflation of Calomel in certain Diseases of the Eye 314
4. George Lawson, On Paracentesis of the Cornea 317

Part II.—REVIEWS.

Displacement of the Pupil by Iridodesis, by Dr. Pagenstecher 321

Part III.—MINOR CONTRIBUTIONS, ETC.

1. Case of Cysticercus (Telæ Cellulosæ) in the Anterior Chamber of the Human Eye, by J. Windsor..... 322
2. Case of Cysticercus in the Interior of the Eye, reported by S. Wells 324
3. Protrusion of the Eyeball and consequent Diplopia, dependent upon an Intra-Orbital Cyst, by F. J. Bumstead 327
4. Case of Cataract and Diabetes, by W. P. Swain 331
5. Case of Congenital Dermoid Tumour at the edge of each Cornea, reported by Soelberg Wells..... 332

PAGE

6. Miscellaneous Cases, by J. W. Hulke:
   Congenital Dermoid Tumour upon the Cornea and Sclerotic 333
   Ditto, upon the Sclerotic 334
   Coloboma of the Iris, Choroid, Retina, and Optic Nerve-sheath 335
   Two Cases of Conical Cornea treated by Iridodesis .. 338
   Three Cases of Congenital Cataract treated by Iridodesis 339
   Case of Abscess of the Frontal Sinus 341
7. Mr. Streatfeild, On the advantages of having Eye Instruments gilt (especially some of those employed in Iris-Operations), with a Note concerning Non-Metallic Instruments 342

Ophthalmic Hospital Reports,

and Journal of the

Royal London Ophthalmic Hospital.

Edited by J. F. Streatfeild.

Number 12. *July*, 1860.

This Number being the first of a new Volume, it is a satisfaction to the Editor, in his work, looking back to so much success and anticipating yet more, to consider that, with his colleagues, he has tried the periodical issue of an English Journal of Ophthalmology; and certainly now it has been tried it shall be continued. The first Volume was made up of six quarterly parts, containing pp. 305 of original contributions: the second of five only, but with 50 pages more in it. Some recent Numbers have been therefore much larger in size than those first published, and as the papers, cases, and reports have not been of less value than they were, the better character of the Ophthalmic Reports, it may be believed, will be only improved in the third Volume now begun. At the same time it must be remarked that, as the increased size of the later Numbers has added so much to the expense of the publication, the coloured plates in the Ophthalmic Reports, however important, and the other illustrations must be fewer until many more names are added to the list of Subscribers.

Several new features are now introduced, and each of the headings, for a better arrangement, will appear in the contents as materials are afforded, thus—Various Observations, Selected Cases, Original Papers, and a Periscope of Foreign Ophthalmology. In the next Number, several cases specially investigated with regard to their minute anatomy shall be recorded; and the Periscope is now commenced with a summary translation of an interesting Paper lately published in Germany.

J. F. S.

Selected Cases.

Case XXXVIII.—Plastic Operation for the Formation of New Eyelids.

By Mr. Eccles.

Susan Horswill, aged 16 years, was admitted into the Plymouth Royal Eye Infirmary in May, 1859. She had been subject to epileptic fits, in one of which she fell into the fire, and burnt the integuments of the eyelids of the right eye. The result was, that on cicatrization taking place, the border of the upper lid, containing a few remaining eyelashes, was united to the integuments of the eyebrow, completely exposing the whole of the conjunctival lining of the lid. In like manner, the border of the lower lid was united to the integument of the cheek, about a line below the inferior edge of the orbit, everting the whole of its conjunctival lining. The eye was thus left completely uncovered, and the result was, that ulceration of the cornea had commenced, so that the condition of the poor girl was painful in the extreme, not only on account of the suffering produced by the constant exposure of the eye, but her appearance also was so frightful, that she was unable to obtain a situation as a servant, and was consequently a burden on others. The first point in the treatment was to endeavour to subdue the irritation of the parts involved in the cicatrices, and also of the eye itself; and this was effected by applying lint soaked in olive oil to the eye, so as to exclude the air as much as possible, and to keep the eye lubricated. She found great comfort in this application, and the irritation of the tissues having been somewhat subdued, I determined, in consultation with my colleagues, to attempt the formation of two new lids by plastic operations. On May 19th, I proceeded to form a new under lid. I first made a deep incision along what appeared to be the border of the lid, and then dissected up the conjunctiva with as much of the subjacent tissue as could be obtained, lest by reason of the thinness of the structure, any sloughing should take place. This dissection extended to about the depth of

three-quarters of an inch into the orbit. Having thus freed the conjunctiva extensively, I dissected out a portion of skin in front of the ear, of about the shape and size of the annexed diagram, and which had not been burnt, for of course it was desirable to avoid the employment of any cicatricial tissue in the new lid.

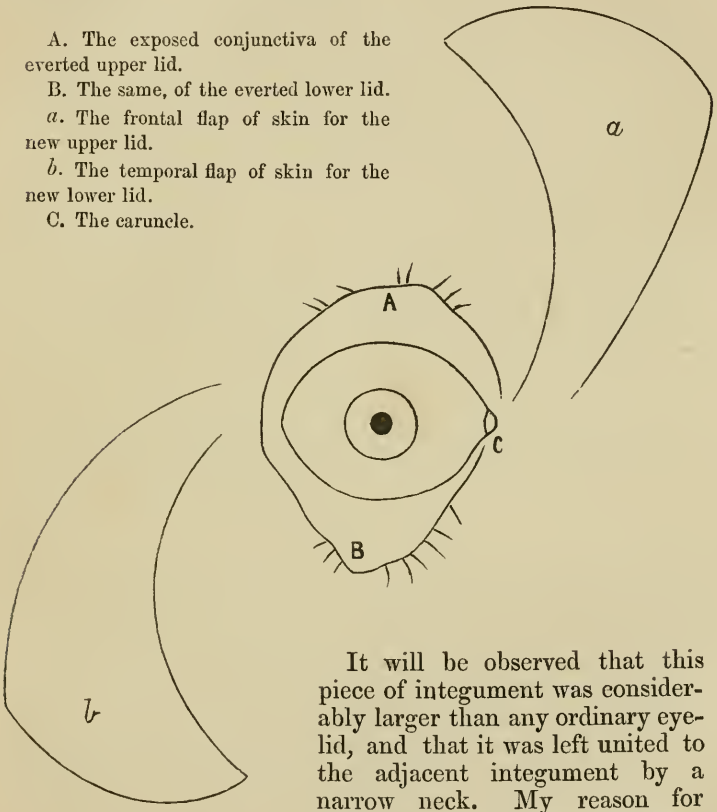
A. The exposed conjunctiva of the everted upper lid.

B. The same, of the everted lower lid.

a. The frontal flap of skin for the new upper lid.

b. The temporal flap of skin for the new lower lid.

C. The caruncle.



It will be observed that this piece of integument was considerably larger than any ordinary eyelid, and that it was left united to the adjacent integument by a narrow neck. My reason for making it of so large a size was this, that I felt certain that the tissues, which I had dissected up, would contract considerably, and so diminish the new lid which was adherent to them. This anticipation proved to be perfectly correct, for the lid was by no means too large after the lapse of a few weeks. The new lid was retained in its place by about twelve interrupted silver sutures, and it united by the first intention; indeed, so strong was the

union on the fourth day, that it resisted the congestion and traction produced by a violent epileptic fit. The ulceration of the cornea speedily healed, and the partial covering thus afforded to the eye produced so much comfort, that although the operation was a painful one, and done without chloroform, on account of the epilepsy, she determined to submit to another for the upper lid. A similar mode of operating produced an equally favourable result. The upper new lid was formed out of the integument of the forehead. The piece removed was of still larger dimensions than that required for the lower lid. (I found that the healing of the frontal wound was much expedited by drawing together its narrowest parts by metallic sutures). This lid also united by the first intention, and I had the gratification of finding, after the lapse of a few months, that she was able to close her eye, sleep comfortably at night, and that she had obtained a situation as a servant. Certainly her appearance was remarkably improved. The second operation was performed in the following July.

Case XXXIX.—Obliteration of the lower Lacrymal Punctum.—Its recovery by a new operation.

By Mr. Streatfeild.

This year, on October the 15th, Christina Stevenson, aged 13, first came to me, from the north, She had had "sore eyes" for a long time, and desultory attendance at infirmaries in Scotland had not bettered them. It was one of those common cases of old neglected tinea tarsi, in which the lashes are slowly all destroyed (those of my patient were nearly all gone), the edges of the lids are rounded, and the limit of the skin (which is shiny), and the mucous membrane (which is very red) is lost: there are also some incrustations upon little ulcers of the lids' margins, the lower lid (especially when the patient looks upwards) is not quite in apposition with the globe, and the lower punctum is everted and must be looked for (according to the relation of the parts) in the tense thin skin of the lid, which seems to have advanced inwards on the lining membrane beyond its proper limits. It is now well known that in such a case to re-establish the right course of the tears, and prevent their continued over-

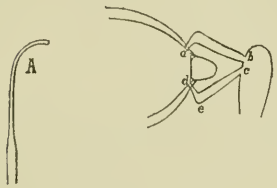
flow of the lids, with its future consequences, by slitting up the lower canaliculi is the first indication. (In the next place it is my habit to cut close with scissors, any remaining lashes, remove incrustations carefully, and touch the edge of the lid lightly with nitrate of silver, and order for the patient's use, fomentations and some simple ointment, at first). In the present instance I had slit up the left lower canaliculus, having, with much difficulty, found the punctum, and passed in by it the fine director; but I could not find any indication at all of the right lower punctum, whereabouts it had been, could be guessed, but there all the rounded lid was equally smooth and dry. Many other patients were waiting, and having tried with various probes, for some minutes, to find the punctum, with the skin damped and dry, and in all ways, I gave up the attempt and requested Dr. Bader, to endeavour to pass a probe into the punctum, he also made a long effort, and so did others, but it could not be found, and Dr. Bader, slit up for me the *upper* canaliculus of this eye which we hoped might remedy in some degree the epiphora (the constant cause of the patient's distress), and the lippitudo and slight ectropion. The largest probes, by the left lower and right upper passages, could be passed easily. No water, with Anel's syringe, by the right upper canaliculus, would pass by the lower punctum. I also cut short the few straggling lashes, and put nitrate of silver to the edges of the lids.

Next time she came, both eyes were more comfortable, and less disfigurement to the poor girl, the left was very much better and the right was improved, but I knew it could not be cured so, without patency of the lower tear duct, which, because it is the lower or for some other reason, seems to be always required. Now this was not an uncommon case, it is a very unsatisfactory state, and I began to consider of a remedy: how to reinstate the lower tear-duct when no orifice could be found for the admission of the tears. According to the anatomy of the parts I thought I might be able to pass a probe from the upper canaliculus into the lower one, the upper canaliculus was already slit up, and this would facilitate the use of the probe. I did not think that the lower canaliculus was likely to be obstructed or diseased, although the punctum was lost. The course I proposed to take with the probe was all by soft parts, which would readily yield, and if I could keep the probe in the right course throughout and avoid entangling its point in any fold of

mucous membrane, I thought I might be able either to pass the probe's point out at the place of the lower punctum, or at any rate, by feeling with the finger, detect the probe's point, and cut down upon it through the mucous membrane. I did not believe in the valves which have been supposed to exist at the extremities of the canaliculi towards the lacrymal sac, and I knew that exploratory operations (incisions made by the conjunctiva, etc.) for the discovery of the lost passage had not been successful.

On the 22nd, when she came again, with the eyelids of the two eyes improved, but unequally, I took one of Mr. Bowman's canaliculus styles,* and bent the end of the thin part into a small curve (A. in the figure) and just the point of the part curved (turned towards me) bent a very little to my right hand. I chose this canaliculus style instead of a probe, because I was sure the thin part of it would be long enough for my purpose, and the thick part I thought would be more convenient to be held in the fingers and more easily directed than a very fine probe such as I should (hoping to be able to pass it out through the lost punctum), have been obliged to select for the attempt.

I took the thick part of my instrument and holding it



A. the instrument. *a, b, c, e, d,* the direction it was made to take.

downwards close to the patient's cheek in a line with the nose, passed the point of the bent thin part into the upper canaliculus, passed it along it without moving the position of the handle, and pressed it inwards until I was sure the point must be in the sac, then I brought the handle round towards the temple, making the point of the instrument keep, as well as I could judge, in the direction of the outlet of the lower canaliculus by an abrupt turn, according to the anatomical relation of the parts (*a, b, c, d,* in the figure), to reverse the direction of the point (carefully avoiding any force, and, when

* Ophthalmic Hospital Reports, vol. i, p. 19.

the point seemed to be caught, moving it about a little) then the handle being brought over the brow of the patient, I gently pressed the point along the lower canaliculus, which with very little difficulty I found I had entered. I could feel the point of the instrument distinctly through the conjunctiva, but could not bring it out through the punctum at first,* and thought of cutting down on the point, but by bringing the handle more across the root of the nose between the eyebrows, and manipulating a little with a finger the skin of the lower lid, the point showed at the punctum, and with the pressure of a finger it emerged, then I simply divided the lower canaliculus to some extent, upon the probe, withdrew it, and ended in the regular course, by passing in at the opening I had made, along the remains of the canaliculus, and down the nasal duct, No. 6, (the largest) probe.

On the 29th, I found the patient's state rapidly improving. The escape of the tears was perfect, the sore edges of the lids were nearly healed, the natural appearance of the skin was restored and the ectropion was consequently almost cured. Her appearance and the state of the parts was, soon after this, as much improved as they could be, for her eyelashes were at first destroyed.

On November 5th, the lippitudo was less conspicuous, and so she was doing well. This day I practised again with the bent style, the "tour" I had made on the 22nd, this I did in order to learn how it should best be done. I was surprised to find that, as she sat in a chair, I could not do it at all; this I could only think was on account of the twitching of the eyelids, which she could not control (the orbicularis and tensor being in constant movement whilst I used the instrument), and it appears to have been so, for when she was put under the influence of chloroform (which on the former occasion she had taken) I, with very little difficulty, passed the bent style from the upper punctum and canaliculus, by the sac, through the lower canaliculus and punctum. In passing the bent style I found it was best to press the convexity of the curve rather upwards in traversing the upper and downwards in the lower canal, thus more probably, keeping the point of the style free from entanglement. The knowledge of when to make the sharp turn to (avoid the nasal duct and) enter the lower canaliculus, I gained by

* It then had probably reached to the end of the longer and larger division of the canaliculus, (to *e* in the figure), to the angle at which the narrower part (next the punctum) joins the wider portion of the canal.

passing the point inwards towards the nose till I felt the bone, then drawing the point a little back, I rotated it as on this point, and directed it first down and outwards, and then more outwards. I never used any force with the point of the instrument, but when the bent style has been in the way here described, passed into the lower canaliculus, of course a fold of the skin of the upper lid rests against the handle of the instrument.

In order to learn that I was able, if in any case in future it might be desirable, I afterwards on this occasion, passed my bent style once in the contrary direction to that I had been practising (also with little difficulty) that is to say from the *lower* canaliculus, by the sac, and out at the upper punctum.

Case XL.—Accidental Trichiasis (Conjunctivitis) of two or three Lashes only of the upper Lid at the outer angle of the Lids.

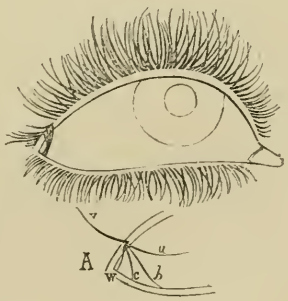
By Mr. Streatfeild.

On the 11th of October, this year, I saw a case which I now describe in the above title as I have no precedent in other cases of the kind called by any name; none have been recorded, and indeed it is not a very important matter although it must be noteworthy, like other minor facts.

A healthy young man came to me at Moorfields, complaining of a slight "cold" in his left eye only. There was some extra secretion of tears in this eye, and the ocular conjunctiva was slightly reddened, which I afterwards discovered to be so chiefly on the outer side of the cornea. As in the examination of any case of conjunctivitis, I, with two fingers, separated more the eyelids, and then found the slight inflammation of this eye which existed was kept up by the inversion beneath the lower lid, of a little bundle (three or four) of the upper lid's lashes, near the outer commissure of the eyelids (as represented in the wood-cut), brought about by them also in the first place no doubt; and these were cause and effect of which, several times, I have seen instances, when consulted for the inevitable consequence of such a state.

The inverted lashes of trichiasis, as it is understood, are turned in so by some old vice affecting their growth, and, if they can be turned out at the time, they will resume their wrong direction as soon as the force, used to replace them in their normal position, in relation to the eye, is disused; but in the few cases of which the one above quoted is an instance, the inverted lashes are so only by a mere chance, and if they are brought out, as they very easily can be, they will, left alone, remain (if not quite as they should be, because of the habit of inversion they had had), away from the eye, and will soon resume their normal direction altogether, and their natural appearance, without any tendency of their own to reinversion. Moreover the cases to which I would call attention are peculiar in the fact that this *accidental* trichiasis only affects certain of the lashes and very few of them, those namely, which are of the upper lid and next to the outer angle of either eye, or at any rate very near to this commissure. In this trichiasis, produced mechanically, the inverted lashes can never be of the thin, curly, pale sort so often seen in the common complaint, but they are strong and retain the regular size, shape, and colour of the other lashes not misdirected.

In the case I now refer to, the last of three or four of



In the diagram (A) the eye-lash V being forced downwards to *a*, *b*, *c*, finally becomes fixed under the lower lid, at W.

the kind I have seen, the inverted lashes were not quite the most external (see the wood-cut); but in the former cases of this peculiar displacement, the outermost lashes were those affected. It should be remarked that, of either lid, the lashes are largest and longest about the centre, there they stand directly forwards, but, towards either extremity of the

two rows, the lashes are smaller and shorter, and are directed not only forwards but somewhat *laterally, from the centre, either way,*) the outer ones rather outwards and *vice versa*). In any case, so many of them as are retained in this abnormal position, lie between the ocular conjunctiva and that of the lower lid, they point outwards in an exaggerated way then, and perhaps so much so as to lie exactly along the margin of the upper lid and be directed to the junction of the two lids at their outer angle, towards the temple, across, if they are not the outermost, beneath the others, remaining in the little space externally where the ocular and palpebral conjunctivæ are in constant apposition. Thus they are pretty much hidden, and if they are also of light colour they may not be very readily detected.

Generally, I have simply with the blunt end of a small probe at the outer angle of the lids, inserted between the margin of the upper lid and the inverted lashes, pushed them out and forwards, replaced them and left them in their place with those next to them, but, in the present instance, I pulled them out altogether, not that I thought they would come upon the eye again but because it seemed to me that the patient in rubbing or wiping the tears from his inflamed eye might easily get these lashes again tucked in and the habit of misdirection these few lashes had then acquired was very evident and would be probably best lost by their growth "de novo." This patient, as in the other cases, came no more to the hospital, and no doubt, the conjunctivitis was cured.

What was the probable cause of this singular inversion? The patient's eye had been inflamed several days and he had put on it poultices, had the weight of the poultice pressed some lashes in upon the eye and the lower lid closed over them? It is possible, but I rather incline to think that the inflammation followed the inversion of the lashes, that therefore the poultices he had used were applied and that the lashes in this and the other cases (in which poultices had not been, that I remember, used) have been inverted by the knuckle of the person's own hand in rubbing the eye casually. I have sometimes, in rubbing my own eye, got some of the lashes of the upper lid tucked under the margin of the lower one and then have let them replace themselves by purposely opening the eye very widely: but a patient, not considering what may occur, perhaps rubs the eye when the lids are *not quite closed*, and having pressed in upon it some

of the lashes near the outer angle, then closing the eye, as he would do instinctively, he has them caught by the opposite lid, and especially as any one, with an irritable or inflamed eye, keeps it rather closed, and never opens it very widely) those lashes that are situated where the lids are nearest together are retained. As I had not seen either of the cases before the lashes were turned in, I do not know if the eyes had been *previously* inflamed, probably not, these patients come no more to the hospital when the deviation of the lashes is corrected, and the conjunctival inflammation, which they experience, is never severe* from this, which I take to be the cause, being so slight. I suppose if the skin is thin, and the lashes long and drooping, they would be more probably kept in by the opposite lid; but those only near the outer angle, where the two lids are nearest together, would be likely to be held when the eye is opened. They have been, probably in rubbing the eye, pressed in upon it, and by chance, these outer lashes being in the same way then forced, from their outward direction, towards the centre, pass under the lower lid and resuming their inclination outwards, from the centre, so get locked in, (see wood-cut, diagram A) and thus, by taking the course *a, b, c* in the diagram, lashes too long to be passed directly under the edge of the opposite lid, even when the lids are widely opened, may get fixed in this position, and, retained by the lower lid, they are directed in the way (*from* the widest part of the palpebral aperture) least likely for them to get free; and, as in the case under consideration, these outer lashes, held down by the lower lid seem to become turned outwards much more than they naturally are, and to be directed from (the cornea) the most prominent part of the eye. The lashes of the *lower* lid would never I suppose be liable to be detained by the other, because they are short comparatively, curved more from the eye, and weaker than the upper lashes always. I have never seen the normal *lower* lashes in under the upper lid.

* The irritation of inverted lashes, in trichiasis, or of any foreign body, it should be remarked, is less, "ceteris paribus," in proportion to their distance from the centre of the rows of lashes, because in opening and shutting the eye so much less distance is traversed upon the globe, and the sclerotic conjunctiva is less sensitive and yields more to any foreign body than that upon the cornea. To avoid movement, as much as possible, it is, that a patient, with an inflamed eye, does not open it widely, and therefore I imagine we should more frequently bandage an inflamed eye than is usually done, or keep the lids closed, at any rate.

The little accident I have here detailed, as I have noted its occurrence several times in the last few years, should be well known. My remarks on the fact may be briefly summed up thus:—The lashes near to either commissure are not only directed forwards but rather towards it. Those (of the upper lid) at the outer angle (pointing outwards) being pressed in the contrary direction and forced upon the eye resume their normal (outward) direction when it is possible for them, although they are still held down by the opposite (lower) lid being over them. Detained in this abnormal position, these lashes tend rather to exaggerate their normal direction (towards the temple) than to take the (opposite) course, which would be most likely to free them.

Original Papers.

ON THE

DIVISION OF THE CILIARY MUSCLE IN *GLAUCOMA*.

By Mr. Hancock.

(*Received September 4th.*—Ed.)

The relation which the ciliary muscle bears to the other constituents of the eyeball, entitle it in certain diseases of this organ to a greater amount of consideration than it has hitherto received.

It is closely connected with the line of junction between the cornea and sclerotica, the choroid and iris, and receives the middle portion of the posterior elastic layer of the cornea, whilst the most anterior portion forms distinct columns, and constitutes the pillars of the iris (Bowman), or the "ligamentum iridis pectinatum," (Huck.) It is continued into the iris upon the anterior surface of which its fibres may distinctly be traced. It is closely attached to the circular sinus of Schlem, connecting the iris to this point, and constituting a bond of union between it and the ciliary processes; the retina likewise terminates in its ora serrata at the posterior edge of this muscle. The long and several of the anterior ciliary arteries pass through it, as well as many of the posterior ciliary arteries, in their passage from the choroid to the iris; whilst the choroidal veins having reached the ciliary muscle, "turn with a sharp curve along it, and uniting, form a nearly straight horizontal vessel of considerable size along its posterior edge," (Nunneley, Organs of Vision, page 168).

The ciliary nerves also run through it, ramifying freely throughout its substance.

It would thus appear that the ciliary muscle, whatever its especial functions may be, is a bond of union between every coat of the eye with the exception of the conjunctiva, the cornea, sclerotica, choroid, iris, ciliary processes, and retina, being more or less connected with it; and we may, I believe, fairly assume, that not the least in importance of its functions is, to exert an uniform action or influence over the several coats of the eye, in their adaptation to the various foci necessary to the perfection of vision.

Connecting these anatomical facts with the pathological appearances in glaucoma, I believe that anything which deprives the ciliary muscle of its natural elasticity, whether undue spasmodic action or otherwise, must exert a prejudicial influence, and tend to increase if not to perpetuate the pathological conditions observed. These conditions have been so fully described by other writers in this journal, that it is unnecessary to do more than to allude to them here.

I have elsewhere stated my disbelief in the theory that glaucoma is mainly and originally attributable to an excess of fluid within the eyeball, producing intraocular pressure; this fluid would not be poured out unless it were preceded by some derangement of function or structure; a derangement manifested in the morbid changes in the blood-vessels of the choroid and retina.

In the more advanced cases of glaucoma these vessels are found to be affected by atheromatous or fatty degeneration, whilst in the more recent instances "the capillaries of the retina are studded with small pouches, which frequently give way, and allow the blood to spread either amongst the elementary tissues of the retina, or bursting through the hyaloid membrane to form clots in the vitreous humour."

The larger vessels of the choroid become varicose, and by their pressure outwards cause absorption of the sclerotica, and produce staphylomata of this tunic of the eye.

I have so commonly found that patients labouring under glaucoma have previously suffered from rheumatism or gout; I have so frequently observed the gouty swellings on the

joints of the fingers of these patients that I have for a long time past regarded glaucoma as originating in one or other of these diseases, as being in fact another manifestation of this same pathological condition; and although in the earlier stages of such cases there may not be any appreciable change in the minute vessels of the retina and choroid, we may, I would submit, fairly infer that they are in an unhealthy condition, predisposed to further morbid change of structure, and less capable of resisting pressure, or of overcoming any interruption to the circulation of their contents, than in their more healthy state.

On the other hand, I am far from asserting that glaucoma is caused by spasm of the ciliary muscle.

What I believe is, that glaucoma is due originally to a gouty or rheumatic condition of the blood; that the muscular fibres and blood-vessels become implicated, as sooner or later do the heart and blood-vessels in these complaints; that the ciliary muscle is either as in the acute or earlier period of the disease, thrown into undue action, or as in the advanced stages of the same complaint, is converted into a state of mere atrophy, and is thus deprived of its elasticity, and that from the peculiar arrangement of the vessels of the choroid with reference to this muscle the circulation through these vessels is impeded, whilst their coats already weakened by the exciting disease, yield, form pouches, give way, or become varicose; and that the intraocular effusion takes place subsequently to, and resulting from, these morbid changes.

I have often observed, particularly in acute glaucoma, that the eyeball is elongated in its antero-posterior axis; that the cornea has become more prominent, apparently at the expense of its several diameters; and a distinct sulcus or depression has surrounded the anterior segment of the eyeball, corresponding to the situation of the ciliary muscle, whilst the vessels in its neighbourhood were extremely turgid and congested.

It was this fact which led me in the first instance to sup-

pose that the constriction at this point, from whatever cause it might arise, exerted great influence over the persistence of the disease. The mere presence of fluid within the eyeball could not *per se* account for the sclerotic staphylomata; the elongation of the eyeball in its antero-posterior axis, or the constriction behind the cornea. On the contrary, the pressure acting equally on all parts of the interior of the globular eyeball, the greater the internal pressure, or the larger the quantity of the fluid effused, the less irregularity would there be on its external surface. Neither of itself could it produce cupping of the optic papilla, pulsation of the retinal artery, aneurismal swellings of the retinal veins, or a varicose condition of the choroidal veins, etc. If the disease depended so entirely upon the presence of fluid, the operation of paracentesis, as performed in our own times by Middlemore and Desmarres, would in all probability have proved successful, and the evacuation of the fluid been followed by almost instantaneous relief to the symptoms; but this has by no means been the case after my operation, inasmuch as in several instances there was very little, if any, improvement to vision for some weeks after the operation was performed, as in the following case:—

"J. C., æt. 57, readmitted into Royal Westminster Ophthalmic Hospital, 15th February, 1860, with glaucoma of the left eye.

"Since his previous discharge from the Hospital, the right eye, on which iridectomy was performed, has been free from pain, but the sight has continued much the same, only the power of distinguishing light from darkness remaining. He has now almost completely lost the sight of the left eye, being just able to perceive light; he has occasionally some pain in it, and sees flashes of fire before it. The eyeball is hard, the pupil nearly insensible to light, the humours turbid, with some opacity of the lens, so that the retina and choroid cannot be seen. There is a distinct greenish reflection from the pupil; the cornea is not prominent, but somewhat rough on its surface, though quite transparent. The right eye has

much the same appearance; if placed opposite the light he can tell if any dark body be moved before his eye, but he cannot distinguish its form.

"17th.—Mr. Hancock divided the ciliary muscle in the left eye.

"20th.—The patient has experienced very little pain since the operation; the wound in the sclerotica has healed; the pupil is very slightly drawn towards the incision; the sight remains much the same.

"25th.—Has had a little pain in the eye and forehead, but that has now passed off; the eye has much the same appearance, and he thinks he can see a little clearer.

"27th.—Very little change in the patient's condition; though if anything his sight is clearer.

"March 1st.—To attend as an out-patient.

"23rd.—His sight is now decidedly improved; he can distinguish small objects, such as a key, pencil case, etc., and can tell how many fingers are held up before his eyes. The pupil has regained its natural shape."

Regarding the fluid therefore as playing but a subordinate part in the disease, it seemed to me that the first object to be attempted, was the improvement of the blood-vessels by removing constriction, and so relieving the circulation through them, with the view of either entirely arresting, or at all events of diminishing, the abnormal secreting action. The mere evacuation of fluid would avail but little unless at the same time the whole of the coats of the eyeball were freed from the constriction caused by the ciliary muscle already adverted to.

If a ligature be tightly passed round a limb, œdema or an abnormal collection of fluid takes place, with swelling and proportionate disturbance of function.

Relieve the constriction by division of the band, and the freedom of the circulation is restored; tension is removed by absorption of the fluid, and *pari passu* is function regained.

Here, no fluid has been lost, and yet the result is healthy action. What would be the utility of puncturation if the band were still girding?

With this object I proposed the division of the ciliary muscle, not for the sake of dividing the muscle simply, but with the intention of, at the same time, cutting through and freeing the attachment of the several parts connected with it; *e.g.* the cornea and sclerotica at their junction, the middle portion of the elastic layer of the cornea, the choroid, iris, pillars of the iris, etc.

The operation, which is very simple, and I am told by no means painful, is performed in the following manner :—

A Beer's cataract knife is introduced at the outer and lower margin of the cornea, where it joins the sclerotica. The point of the knife is pushed obliquely backwards and downwards, until the fibres of the sclerotica are divided obliquely for rather more than one-eighth of an inch; by this incision the ciliary muscle is divided, whilst if there be any fluid accumulated, it flows by the side of the knife.

The quantity of fluid varies considerably; in some instances it is great, in others scarcely appreciable. That the benefit resulting from my operation (the division of the ciliary muscle, etc.), does not depend upon the mere evacuation of fluid, is shown by the following case, which has been kept and kindly furnished to me by my friend Mr. Whitney, of Great College Street, Westminster, whose patient the young lady is, and I believe has been from her birth, and with whom I attended the case.

"Miss H. F., 26 years of age. The left eye became affected six years ago, with acute iritis. Under a mercurial treatment the inflammation subsided; but in about three or four months, after exposure to cold, relapsed. This second attack was treated with mild mercurials, combined or alternated with a variety of tonics, accompanied with constant appliances of counter-irritation. This course of treatment, which extended over a period of three years, exercised little control over the steady, obstinate progress of the disease, evinced by permanent chronic sclerotitis, contracted and irregular pupil, with progressive opacity in the capsule of the lens and lens itself, and opacity in the circumference of the

cornea. These conditions were accompanied by gradual loss and ultimately utter extinction of vision in the left eye.

"Subsequently two or three very small spots of deposit were observed on the iris of the right eye. An issue was now made in the right arm, and the little spots on the iris soon disappeared.

"This eye continued in a sound state for two years. Three months ago the patient experienced suddenly (after some exposure to cold), a sense of dimness and weakness of sight. The issue (which in consequence of much debility had been gradually permitted to heal), was immediately reopened, but without effect.

"The sclerotica soon presented a slight zone of redness, which quickly became a bright circle of inflammation around the cornea. The iris bulged forwards, the pupil becoming dilated, irregular and appearing notched on its inner margin, with a whitish, fibrinous-looking deposit at this point. The lens and its capsule appeared cloudy. Vision was now rapidly failing; nothing could be clearly seen; the power of defining objects was gone.

"Mr. Hancock having seen the eye, decided on performing his operation for dividing the ciliary muscle. He therefore operated seven weeks ago. It was distinctly observed that *no* fluid escaped from the puncture made in the eyeball.

"The eye was dressed with cold water, and the patient put to bed. In ten days the sight began to improve, with gradual subsidence of the inflammatory appearances; the pupil gradually to recover its shape, and the fibrinous-looking deposit is daily diminishing."

She can now define small print distinctly.

In performing the operation, care should be taken not to allow the incision to extend at all into the transparent cornea, as when this takes place the iris is apt to protrude through the cut, and the pupil is consequently deformed by being drawn in that direction. When, however, this does occur, it is of but little importance, inasmuch as in the large majority of cases the iris resumes its proper situation, and the pupil its natural shape; and in those cases in which the iris is not com-

pletely withdrawn from the wound, the resulting deformity of the pupil is very trifling. When performed for acute glaucoma, wherein the pain has been very intense, the relief has followed almost instantaneously; the smarting of the operation may last half an hour, or even two or three hours, but patients usually distinguish between the two, and whilst noticing the smarting, express their satisfaction at their freedom from the agony which they endured previous to the operation.

That this operation exerts a very great and very decided influence, is proved by the improvement which takes place in the physical appearances of the eye after its performance.

Dilated and fixed pupils have resumed their natural size and action; cupping of the retina and pulsation of its vessels have disappeared; the varicose and congested state of the choroidal vessels with the resulting sclerotic staphylomata have subsided, the eyeball becoming even upon its surface, and losing its abnormal hardness.

I have entered thus at length upon the peculiarities of my operation, and my reasons for proposing it, as I find that notwithstanding the explanations which I have already published, it has been stated by a recent writer, one of the chief supporters of iridectomy, that this operation is merely one of paracentesis, similar to that performed in our own times by Middlemore and Desmarres, and consequently, from the absence of originality unworthy of consideration. The operations of Middlemore and Desmarres were avowedly those of "paracentesis" in its most literal sense,—a puncture for the evacuation of fluid. My operation, on the contrary, is proposed, avowedly, not for the evacuation of fluid, but for the division and freedom of certain and particular parts. And although fluid, when present (which I have shown is not in all cases), flows by the side of the knife, it is merely a coincidence, not a primary object. In fact, from the situation in which von Graefe makes his first incision I believe that he at the same time cuts through the ciliary muscle, whence the success of his operation; and I quite expect that in process of time it will be found, that the extent of this incision may be materially diminished and the tearing away of the iris altogether dispensed with.

PARALYTIC AFFECTIONS OF THE MUSCLES OF THE EYE.

(*Concluded.*)

By Dr. J. Soelberg Wells.

(*Received July 9th.*—Ed.)

Having finished the consideration of the different symptoms presented by the paralyses, let us now turn our attention to their causes, prognosis, and treatment; and let us also glance at the course which they may run, and at the different processes into which they may pass over or give rise to.

We sometimes meet with congenital paralytic affections of these muscles. Thus for instance, we may see *ptosis congenita,* or a more or less complete paralysis of several or all the branches of the third pair. This may be caused by intra-uterine affections, or may be due to the imperfect development of the muscles of the eye, etc. As we often find that the parents of these children have suffered from affections of the muscles of the eye (squint, etc.), it appears very probable that there must be in some families a hereditary predisposition to these lesions.

*Causes of Paralyses of the Muscles of the Eye.**

I. *Rheumatism* furnishes a large number of cases. We find that the onset of the affection may be exceedingly rapid.

* I have not included amongst the list of causes that supposed to be dependent upon reflex action. The opinion that paralysis might be owing to this was first proposed by Romberg, but has since then been strongly opposed by Hasse and others, and it seems, that however true it is that spasmodic affections are very frequently due to reflex actions, the same cannot be said with any amount of certainty with respect to paralytic affections.

The patient has caught a cold, or has been subjected to a draught of cold wind which has played upon his cheek, this is soon followed by pain around the orbit and masked *diplopia*, etc., as a premonitory symptom of paralysis. The palpebral branch of the *oculomotorious* is very often the seat of such a paralysis. Mackenzie mentions "a case of paralytic *ptosis* induced on both sides, in a man who walked about all day, with his hat wet from having dropped it into a river."

The patient generally complains of more or less severe pain around the orbit, also when the eye is moved. In certain directions some degree of diminution in the mobility of the eye will become apparent, and then the accompanying *diplopia* will soon let us ascertain with certainty what muscles are affected. At present the pathological changes which occur in these rheumatic paralyses have not received a satisfactory explanation, and we do not yet know exactly whether deposits or other changes take place in the substance of the muscles or nerves distributed to the affected part, or whether the fibrous tissues which invest the nervous trunk are the seat of the rheumatic inflammation. At all events the changes met with in the examination of these structures are not sufficient always to account for the amount of disturbance in the mobility of the parts; and it appears probable therefore that the presence of these deposits may be very transitory and that they may not leave behind them any appreciable lesion of the substance of the nerve or muscle.

The *prognosis* is favourable in this form of paralysis, particularly if the patient applies very soon after the invasion of the disease. It generally passes away without leaving behind any impairment in the functions of the muscles.

The *treatment* should be chiefly antiphlogistic. The patient is to be freely purged with a good dose of calomel and colocynth or jalap; an emetic is also of service and may generally be repeated with advantage, as we often find great improvement after its administration. It is also very serviceable to keep up, in a later stage of the affection, a

state of nausea by giving tartar emetic. Leeches should be applied before the ears, and blisters in the nape of the neck or behind the ears. Diaphoretics, colchicum, Dover's powder, etc., are to be administered and the Russian vapour bath may be also recommended. When the inflammatory symptoms have subsided we generally find much good resulting from the use of the intermittent galvanic current, which may at first be applied at an interval of one or two days and afterwards every day. Owing however to the fact that it cannot be applied *directly* to the muscles of the eyeball it is mostly less efficient than in paralysis of the *orbicularis palpebrarum* where its application is direct.

We must here mention the fact, that inflammation of the capsule of Tenon may give arise to a transitory paralysis of the muscles of the eye. This affection, which has sometimes been described as *myitis oculi*, is generally caused by draughts of cold air playing upon the cheek and eye. The patients complain of severe pain in and around the orbit, the *conjunctiva* is more or less injected, there is often a good deal of serous *chemosis*, slight *exophthalmos*, slight *ptosis* and a variable degree of immobility of the eyeball. The movements of the latter are painful and sluggish and accompanied by a feeling of tension in the eye. The treatment must be antiphlogistic.

II. *Causes situated within the Orbit.*

These are very numerous and we can but point out the most common and frequent amongst them. Effusion of blood into the orbit is often the very sudden cause of paralysis.

Von Graefe has reported an interesting case of paralysis which was most likely owing to this cause.* In the left eye of his patient. the *R. superior*, *R. inferior*, and *O. superior* were *completely* paralysed, the *R. internus*, *R. externus* and optic nerve partially so. The paralytic affection therefore extended simultaneously over the course of four nerves, viz., the *oculomo-*

* Graefe's Archiv, vol. i. part 1, p. 424.

torius, abducens, trochlearis and *opticus*, and its cause could therefore only be situated within the orbit or *cranium*. The left eye appeared a little prominent, and its sight was very much affected, for the patient could only with difficulty decipher very large print. The complete absence of any symptoms of a cerebral lesion led von Graefe at once to think it owing to some cause within the orbit, situated most likely near the posterior apertures, as the nerves lie here in such close proximity to each other. The patient did not complain of spontaneous pain, but only of a dull feeling of pressure in the depth of the orbit. Upon pressing the eyeball backwards a good deal of resistance was felt, and the patient complained at the same time of tolerably acute pain. These facts together with the absence of all inflammatory symptoms, and the sudden appearance of the affection after a very fatiguing exertion, led von Graefe to diagnose an effusion of blood into the orbit behind the eyeball, which caused a compression of the aforesaid nerves. The correctness of this diagnosis was borne out by the fact, that the symptoms very rapidly disappeared after the application of leeches, purgatives, and maintenance of strict rest of the eyes. Within two days the pain upon pressure and the prominence of the eye decreased and soon disappeared altogether. After the lapse of six days the vision was vastly improved, and at the end of a fortnight the different paralyses had been completely cured.

Amongst the other causes, situated within the orbit, by which paralyses may be produced must be mentioned, aneurisms, aneurism by *anastomosis*, tumours within the orbit, which tumours may be encysted, fatty, osseous, scirrhous, fibrous, etc. Abscess, and formation of matter in cases of inflammation of the cellular membrane of the orbit, or as a consequence of *caries*, may give rise to *exophthalmos* and implicate one or more nerves by pressure upon them.

The cases of *exophthalmos* with *struma* and affection of the heart do not generally cause any diminution in the mobility of the eyes. When the turning point of the eye is very much dislocated the lateral mobility may be somewhat impeded, which gives the patient a very fixed and staring appearance; but as von Graefe has pointed out, the decrease in the mobility is symmetrical in all directions and this serves to distinguish it from that caused by tumours, *exostosis*, etc.

The *prognosis* must depend entirely upon the nature of the cause. For if the primary affection can be removed or dispelled, as for instance in cases of effusion of blood into

the orbit, the prognosis is favourable, for complete restitution may very rapidly follow a proper course of treatment.

The *treatment* must also vary with the cause. In cases of inflammation we must prescribe antiphlogistics; in effusion of blood, leeches, purgatives, etc. In abscess or formation of matter from *caries* we must care for a proper discharge of the matter.

III. A very congested state of the blood-vessels within the orbit or at the base of the brain may exercise pressure upon one of the nerves and thus cause paralysis. Mackenzie points out the fact "that the third nerve is more obnoxious to palsy than any other of the cerebral nerves. This is perhaps owing to its position, as it emerges from the brain, between the posterior artery of the *cerebrum*, and the superior artery of the *cerebellum*. Sometimes the former vessel traverses the trunk of the nerve. Congestion then of these vessels may readily cause palsy of the nerve."

That this may in reality be the case, and that an abnormality in the distribution and position of these arteries may indeed cause a paralysis of the third is illustrated by a case of Türck; who saw a paralysis of both *oculomotorii* caused by their being compressed by small branches of the *profunda cerebri* artery, which entwined them in their meshes.

The *prognosis*. Although this may in some cases be favourable, it must in the majority remain dubious.

The *treatment* should be derivative and antiphlogistic. Purgatives should be administered, and leeches may be necessary, but we must be entirely guided by the cause and character of the congestion.

IV. *Syphilis* is undoubtedly one of the most (if not the most) frequent cause of paralytic affections of the muscles of the eye. Von Graefe, indeed, thinks that about *one-third* of these paralyses are due to it. In many cases it is almost impossible to ascertain with any precise amount of accuracy whereabouts the process which causes the paralysis is situated, and we must be content with the knowledge that the patient has suffered from venereal disease, and under the proper treatment we frequently find a very rapid recovery ensuing.

When nodes, *exostoses*, etc., are situated within the orbit or at the base of the brain, (in the latter situation they are sometimes met with just at the exit of the nerves) they may press upon the nerves and thus impede their action. *Neuroma* if situated in one of the *motor* nerves of the eye may cause an impairment of its function; but although there is every reason to believe that *neuromata* very frequently have a syphilitic origin, this is still doubted by some authorities. Two very interesting cases of syphilitic *neuroma* have been reported by Dixon in the Medical Times, (1858). A tumour was found in each case, implicating the third nerve and the membranes around the internal carotid and basilar arteries. The patients had suffered from tertiary syphilis. These cases are particularly valuable as they show a disease of the membranes co-existing with changes in the structure of the nerves themselves.

Although many observations have been made concerning paralytic and other affections in the brain in persons suffering from *syphilis* the etiological question, as Virchow has pointed out, presents here the greatest difficulties. In many of the cases which have been reported traumatic lesions had occurred prior or during the syphilitic infection, and it was therefore exceedingly difficult and doubtful to determine whether the tumours, etc., were a consequence of the injury, or owing to the syphilitic infection.

Von Graefe narrates a case of paralysis of the *oculomotorius* in a child 2 years of age who had lost the sight of the other (right) eye through *iritis syphilitica*. Upon a *post mortem* examination the left *oculomotorius* was found half as thick only as the right, and irregular, shewing thick opaquely whitish portions, alternating with interjacent attenuations; between these the nerve appeared somewhat more than normally transparent. Three or four such thickenings could be distinguished between the exit of the nerve from the brain, and its entrance into the orbit. These were seen, upon a section, to proceed from the sheath of the nerve, and microscopically the nerve elements appeared indistinct and

granular. In the left *corpus striatum* as well as in the right hemisphere, the brain was found softened, within these "foyers" of softening the substance of the brain appeared greyish-yellow, discoloured, friable and traversed by numerous fine formations of vessels and capillary apoplexies.

We sometimes meet with spots of fatty degeneration of the *neuroglia* in children suffering from hereditary syphilis. For these and other changes which may occur within the brain I must refer the reader to Professor Virchow's admirable paper upon the nature of constitutional syphilitic affections. (Archiv für path. Anat. und Physiologie, Bd. xv.)

The *prognosis* in these syphilitic paralysis may incline towards the favourable side of the scale, but must very much depend upon the seat and extent of the cause.

The *treatment* from which the greatest good is experienced is the administration of the iodide of potassium, it is surprising how rapidly these paralyses often yield to this remedy. In Germany, Zittmann's decoction is also in great favour, it most likely acts more as a powerful diaphoretic than as an antisyphilitic.

V. Causes situated at the base of the *cranium* often produce paralyses of the muscles of the eye. We may suspect the cause to be situated here when several muscles of one eye or still more of both eyes are affected. We should however be exceedingly chary of at once localizing the causes of paralytic affections at the base of the brain or within the brain itself, and should always first think of a cause situated within the orbit. If for instance a patient consults us with a paralysis of several branches of the third pair, and of the *trochlearis* in one eye, we should examine whether the cause may be within the orbit. The eye would in such a case most likely protrude somewhat, owing to the paralysis of the *recti*, but this *exophthalmos paralyticus* will disappear upon slight pressure, and the eye will easily resume its proper position in the orbit. If however any tumour, etc., is situated behind the eyeball, this will not take place and we shall feel some resistance, the patient will at the same time complain of pain

when the eye is attempted to be pressed back. If no cause is found within the orbit, we must examine whether or not some other nerves besides those of the muscles of the eye are not affected. If we find that the facial or branches of the fifth are implicated (without any disturbance of the intellectual functions) we shall be justified in attributing the paralytic affection to some cause situated at the base of the brain.

We find that the causes which have their seat at the base of the brain generally produce paralysis by means of compression of the nerves which lie in this situation. We must enumerate amongst these causes rheumatic and syphilitic *ostitis* and *periostitis, exostoses,* syphilitic *topha,* tubercular deposits, effusions of blood, etc. In cases of syphilitic *periostitis* the patients generally suffer most violent and excruciating pain during the night. It is very important for the patient that we should make the right diagnosis in the latter cases, for if we mistake it for a central apoplectic affection it might prove very injurious. Plastic exudations and tubercular deposits are frequently the cause; or also tumours at the base of the brain, these may be scirrhous, fungoid, etc., and by pressure upon the nerves produce paralysis. In these cases as well as in those caused by aneurism the progress of the paralyses is slow, the reverse is the case (and this may help to assist our diognosis) in cases of plastic exudation, (as in *meningitis*). Here indeed the extent of the paralytic affection may often furnish us with a just criterion of the intercranial lesion.

The paralytic affection increases with the growth of the cause, and is very frequently associated with a diminution of mobility in other parts of the body (paralysis of the extremitics, etc). The intellectual faculties generally escape.

VI. We must now turn our attention to those causes which are situated within the brain itself. The diseases of the brain and the processes within this organ which may give rise to paralytic affections, are, however, of so important a nature, and demand so explicit a consideration, that more

than a cursory review of them would extend beyond the limits of this paper. I must, therefore, beg to refer the reader to special works upon Diseases of the Brain for the necessary information upon this very interesting subject.

When the paralysis is owing to some lesion or process within the brain, we generally find that the patient shows some derangement in his intellectual functions. His memory fails him; he experiences a difficulty in arranging his ideas, or giving utterance to them, etc. These derangements are very often transitory, and may vary in extent from a slight loss of memory, to a state bordering upon idiotcy.

Ptosis is not unfrequently a symptom of a central affection, whereas *lagophthalmos*, as has been before pointed out, is only exceptionally so.

Amongst the processes within the brain which furnish us with examples of paralysis of the muscles of the eye, may be mentioned, softenings of the brain; effusion of blood; tubercular deposits; aneurisms; impermeability of some of the blood-vessels of the brain; tumours situated within the brain, and pressing upon the nerves, hydrocephalus, etc.

The nature of the *diplopia* may afford us much assistance in our diagnosis, and aid us in endeavouring to localize the affection which causes the paralysis. The *diplopia* which is dependant upon cerebral causes shows one very great peculiarity; we find, namely, that the double images in these cases show a very great disinclination to be united. Even with the most carefully selected prism it is found difficult, or even impossible to unite them; and even if we have effected this, the *diplopia* generally awakens again as soon as a very slight alteration is made in the strength of the prism, or in the position of the object. If we find that several muscles, which are supplied by different nerves, are paralyzed, as for instance *R. externus* or *O. superior*, together with one or more muscles supplied by the *oculomotorius*, particularly if both eyes are affected (and we can find no cause within the orbit), we may suspect some central lesion. The same may be said with regard to a succession of paralyses

in different muscles. If several of the muscles, furnished with nerves of the third pair are *successively* affected, and then perhaps the *trochlearis* or *abducens* also, and after this, one or more muscles of the other eye, we are justified in thinking of a cerebral cause.

The *prognosis* in cases of paralysis dependant upon causes situated at the base of the brain, or within the brain itself, must be more or less dubious. We find, however, that a complete restitution may occur if the primary affection recede, as in cases of effusion of blood, exudations, etc. We should, however, be always guarded in our prognosis, more particularly if the paralytic affection be extensive, and dependant upon cerebral causes.

The *treatment* must vary according to the nature of the suspected cause.

With regard to the *general* prognosis of paralysis of the muscles of the eye, it may be laid down as a rule, that the prognosis is favourable in proportion to the freshness of the paralysis. We must, however, also take into consideration the extent of the affection, for the prognosis is better in partial than in complete paralysis. For instance, a partial paralysis of two years' standing affords a relatively better prognosis than a complete paralysis which has only existed a quarter of a year. The character of the *diplopia* is also prognostically of importance. We find, for example, that double images which show only a lateral difference (as in cases of paralysis of the *R. internus or externus*), warrant a better prognosis than the *diplopia*, which presents also a difference in the height of the images. The reason of this is, that the lateral images, more particularly the homonymous, are far more easily united than those which stand above one another. In fact we sometimes see, that in slight cases of paralysis of the *abducens* or *R. internus*, a spontaneous cure is brought about by the domination of the act of vision, which causes the double images to be united. We must, however, be upon our guard, that at a certain stage of the recovery, the tendency rather to extend than diminish the

distance between the double images does not arise and frustrate all our therapeutic endeavours. This tendency is caused by the great annoyance which double images produce when they are very close to each other; if the patient cannot unite them, he overcomes this annoyance by increasing the distance between them by the contraction of some muscle. It will be often necessary to make the patient wear spectacles, of which the glass for the affected eye is covered with paper, or is darkly coloured, in order to exclude this eye completely from the act of vision.

The following reasons may necessitate such a proceeding. 1. In order to prevent any annoyance and confusion from the *diplopia,* and the feeling of dizziness which is often caused by it. 2. To obviate the tendency to enlarge the angle of squinting, in order to lessen the annoyance of the *diplopia* by increasing the distance between the double images. 3. To combat the inclination of the patient to assume an awkward carriage of the head.

An erroneous idea prevailed formerly, that squinting or a paralysis might be cured by the use of so called "squint spectacles." The healthy eye was excluded from any participation in the act of vision, and the affected eye was made to adjust itself upon the object. The error of this proceeding becomes at once apparent, when we consider what the healthy eye does under this exclusion. If, for instance, in paralysis of the *R. externus* of the left eye, the right eye is covered, the left will make an excursion outwards (say of 1 line) in order to adjust itself upon the object. The right eye wil not, however, retain its position, but will make a simultaneous movement inwards, not of 1 line, however, but perhaps of $1\frac{1}{2}$—2 lines; for we have before pointed out, that in *all* cases of paralysis, the secondary angle of squinting is greater than the primary. In time, therefore, even supposing that the paralysis be cured, and the left eye always adjusted upon the object, we shall have produced a squint in the right eye greater in extent than the former deviation of the left eye. For this purpose, therefore, these glasses are to be thrown

aside, but they are very applicable and useful in those cases of *strabismus,* in which we desire to change a monolateral into an alternating squint. After a *strabismus* operation, it is often necessary to make the patient wear a peculiarly constructed pair of "squint spectacles," in order to cure him of a lateral carriage of the head which he may have acquired. Suppose the patient shows after the operation a tendency to carry his head turned towards the right, we should prescribe for him a pair of spectacles of the following construction. The glass of the left eye must be completely covered, so that the left eye is excluded. About the inner two-thirds of the glass of the right eye should be also covered, the outer third being left transparent for the patient to see through. In order to find his way about he will now have to turn his head towards the left, so that he may bring this opening in the spectacles nearer the middle line of his body, his head will therefore be now turned just in the opposite direction to that in which he was accustomed to carry it, and this practice is to be prolonged until the desired result has been obtained.

A similar proceeding may be used in those cases in which we desire to extend the effect of a tenotomy operation as much as possible.

We generally apply *exclusion* of the affected eye in cases of complete or complicated paralysis, but in partial paralyses, if they are not of too great an extent, we may often make a most advantageous use of prismatic glasses.

In my paper upon the paralysis of the *R. externus,* I have pointed out in what manner prismatic glasses are to be used for therapeutic purposes, and explained their mode of action. Our treatment is here based upon the physiological fact, that double images which are very near each other, act in such a manner upon the *retina,* that the latter is incited to call up through reflex action, a muscular effort which shall either unite these double images, or else deprive them of their annoyance by separating them still further from each other. What we desire, therefore, by this therapeutic

use of prisms is, to stimulate the paralyzed muscle to contraction by approximating the double images, and thus heightening their confusing effect. The affected muscle will then make a voluntary effort to unite the double images, and will generally succeed if the tendency to single vision is sufficiently powerful, and the distance between the double images not too great for the facile and easily continued exertion of the weakened muscle. In those cases, however, in which the tendency to unite the double images is absent or but very slight, or where too strong a prism (about 14°) would be required for the necessary approximation, we must not apply prismatic glasses for the purpose of exercising the muscle, in order to free the patient from his *diplopia*, we must therefore give him a prism sufficiently strong to unite the double images at once.

When there are only lateral differences in the double images, the mode of applying the prisms will be at once apparent. If the *R. externus* is paralyzed, we turn the base of the prism outwards, the reverse will obtain in a case of paralysis of the *R. internus*.

When the double images show not only a lateral difference, but also a difference in their height, our object must be of course twofold, viz., to compensate not only the lateral differences, but also those in the attitude of the images. And this we may do in various ways.

Let us for the sake of an example take a paralysis of the *O. superior*. The reader will remember that there is a convergent squint in the paralysis of this muscle, and that the cornea of the affected eye stands somewhat higher than that of the other. The double images are therefore homonymous, and that of the affected eye is projected *beneath* the other. We may apply prismatic glasses for the purpose of compensating these differences in several different ways.

I. The simplest way would be to turn the base of the prism somewhat downwards and outwards.

II. We might apply two prisms, one with its base downwards, the other with its base turned outwards.

III. We might divide the prism between the two eyes, viz., place the one prism before the affected eye with its base turned downwards, and thus correct the differences in the height of the double images. We then apply the other prism with its base turned outwards before the healthy eye, and the following result will ensue. The rays of light (in the healthy eye) being refracted towards the base of the prism, will fall upon a portion of the *retina* external to the *macula lutea;* the eye will therefore make a movement inwards in order to bring the rays of light again upon the yellow spot, the affected eye, however, makes at the same time an associated movement outwards. Now, if the laterally applied prism is of the proper strength, there will be a complete liquidation of the *diplopia,* and single vision will be the result, for we must remember that the differences in the height of the images have been already annulled by the prism which was placed with its base downwards before the affected eye.

IV. In accordance with the fact that the eye spontaneously overcomes the lateral differences far more easily than those in height, we often find that if we compensate the latter by a prism with its base turned downwards, the affected eye will then by a spontaneous contraction of its *abducens* move the eye slightly outwards. The rays will thus be brought again upon the *macula lutea,* and the *diplopia* disappear.

We shall afterwards find that the knowledge and remembrance of this fact may often prove of advantage in those cases in which we perform tenotomy, for the purpose of delivering the patient from the annoyance of *diplopia.*

We have next to examine the course which a paralysis may run, and the different processes which it may give rise to.

" The greater or less power of the act of vision over the

muscles of the eye explains in a great measure the very different issues (Ausgänge) of paralyses, which we have already pointed out at page 186. If the sight of the affected eye is weak, or if any differences exist in the refracting power of the two eyes which predispose to an exclusion, a deviation towards the opposite side will very soon occur, and then if the innervation returns, a *strabismus concomitans* will afterwards arise, or if the paralysis continues, a contraction-paralysis. If on the other hand there is a lively impulse towards co-operation, the deviation towards the side of the antagonist will be opposed to the utmost, and the original symptoms of the paralysis will be preserved unaltered."*

Paralysis may run the following different courses :—

I. *It may be completely cured.*—This is particularly likely to happen if the paralysis is fresh and owing to some peripheral affection. The mobility of the paralyzed muscle increases, the deviation becomes less and less, and the *diplopia* diminishes until at last a complete restitution is brought about.

II. *Incomplete restitution.*—Here we find that all goes well up to a certain point; the cure appears to be progressing towards a favourable termination, when all at once this progress is arrested at a certain stage and a greater or less degree of paralysis remains behind. If the tendency to single vision be strong, this state may last however for a length of time without any secondary contraction of the antagonist. Or again, no restitution takes place, and the extent of the paralysis remaining unchanged, the symptoms of a fresh paralysis are retained. Generally, however, this state lasts but a very short time without passing over into a secondary contraction of the opponent, and this brings us to—

III. *Secondary changes in the antagonist.*—Let us for the sake of illustration again suppose a case of paralysis of the *R. externus* of the left eye, in which the mobility of the eye outwards is completely or partially lost.

* Von Graefe's Archiv., vol. iii, part 1, p. 339.

When the object is moved over to the left side of the patient, the affected eye lags behind, so that *strabismus convergens* arises, which increases in extent the farther the object is moved to the left. When it is held in the middle line or a little towards the right of it, both optic axes will be adjusted upon the object, and follow it accurately throughout the right half of the field of vision. After the paralysis has lasted some time, the *diplopia* begins to extend more and more into the right half of the field of vision. In fact the antagonist (*R. internus*) owing to the lesser burden which it has now to overcome, undergoes changes in its structure which lead gradually to its contraction. The case will now present a mixture of symptoms which belong partly to the paralytic affection and partly to the *strabismus concomitans*. To the first category belong the following. The greater or less immobility towards the side of the paralyzed muscle; the fact that the secondary angle of squinting is greater than the primary; and lastly that the angle of squinting is greater towards the left side than towards the right. From a common paralytic affection it is however to be distinguished by the fact that the deviation is greater in the middle line than in a case of simple paralysis of the *abducens*, and also by the extension of the deviation and the consequent *diplopia* far into the right half of the field of vision. The original paralysis may now be partially or completely cured. If the latter be the case the mobility outwards will be restored, but the deviation inwards will continue and perhaps even increase. The secondary angle of squinting will now be equal to the primary.

I have before pointed out the fact* that if the eye affected with the paralysis enjoys the better vision of the two, and is used in preference to the other, a secondary deviation (which will be greater than the primary) is produced in the healthy eye and this may eventually pass over into a *strabismus concomitans*.

* Page 140.

Paralyses sometimes pass over into *strabismus spasticus* (*periodicus*). This is particularly the case in those forms which arise when the patient is looking into vacancy, or when the eye is covered by the hand; whereas it is not observed when the patient carefully "*fixes*" the object, for then he forces both optic axes to adjust themselves upon it in order to avoid *diplopia*.

We often see this in those cases when after the cure of a paralysis of the *oculomotorius* the *abducens* becomes somewhat contracted during the restitution of the *R. internus* and then a divergent squint may remain. The domination of the act of vision, however, in general counteracts this and enforces the adjustment of both optic axes upon the object. If we however place a prism of ever so small a power with its base turned upwards or downwards before the affected eye, or exclude the sound eye by placing our hand over it, the deviation outwards becomes at once apparent.

IV. *Contraction-Paralysis.*—No restitution takes place in the paralyzed muscle, the opponent at the same time contracting more and more, the affected eye will (in a case of paralysis of the *abducens*) gradually deviate towards the inner side, until it may eventually be stationed almost motionless in the inner angle of the eye.

Let us now consider the operative proceedings which may be required in these different *issues* of paralyses, for according to the nature of these must we regulate and modify our operation. Although it is often difficult to hit at once upon the modification proper for any particular case, a careful study of the general principles by which we are to be guided will soon enable us to gain a great facility in the proper choice of the operation; and it is in these cases and the allied ones of tenotomy for *diplopia* that we are now enabled, thanks to the admirable practice of von Graefe, to alleviate or cure many hitherto hopeless cases.

Cases of incomplete restitution of the muscle affected with paralysis, but without any secondary contraction of the antagonist.—Of course we must try every other means of cure

first, and must not urge the patient to submit to an operation until we have found that all the other remedies have proved unavailing, and that the paralytic affection shows itself, after the expiration of many months, perfectly stationary.

The mode of operation will depend completely upon the amount of immobility in the direction of the affected muscle. Let us assume that, after a paralysis of the *R. externus* of the left eye, the immobility outwards amounts to 1–1½ line, but that there is no deviation inwards, so that the *diplopia* extends only up to the middle line or but slightly into the right half of the field of vision. In these cases von Graefe recommends a simple tenotomy of the antagonist, if there is any *diplopia;* without this it is not worth while to make the patient submit to an operation on account of the very small amount of diminution in the mobility of the paralyzed muscle. Our purpose in operating is to expel the *diplopia* from the middle portion of the field of vision, for this is just the space where it is all important to the patient to enjoy single vision.

If we perform a tenotomy of the *R. internus* and layer the muscle back about 1–1½ line, the following will be the result. The effect is completely *mechanical* and does not act upon the innervation in the slightest degree. By giving the *R. internus* a more backward insertion we diminish its influence upon the eyeball and the latter is now a greater burden for the muscle than prior to the operation. Owing to the weakening of the *R. internus,* the eyeball will now have become a lighter burden for the *abducens,* (still somewhat weak and inefficient from the remains of the paralysis) which will therefore be enabled to move the eye somewhat more outwards, and consequently the deficiency in the mobility outwards will now perhaps only amount to ½–¾ of a line.

In the centre of the field of vision the patient will now enjoy single vision, whilst some *diplopia* will still remain towards both extremes of the field. When the eyes are moved far to the left a slight convergent squint and *homony-*

mous diplopia will arise, owing to the slightly remaining immobility of the *abducens* in this direction. The reverse will be the case if the eyes are moved far over to the right of the patient, for in consequence of the slight insufficiency of the *R. internus* a divergent squint will arise at a certain point, and the *diplopia* will therefore be *crossed* in this direction. This will not however annoy the patient in the least, for he will avoid the *diplopia* by slightly turning his head instead of his eyes when he desires to see some object lying very much to either side of him. Even in a normal state of the eyes we seldom make use of these very lateral movements, but we generally turn our head to one or the other side. Experience proves that the crossed *diplopia* does not show itself till far to the right of the patient, and also that the single vision will gradually extend further and further into the left half of the field of vision. Sometimes however this apparently excellent effect of the operation decreases again after some weeks; and this has made von Graefe lay down the rule that when the diminution in the mobility of the paralyzed muscle exceeds 1–1½ line, and if the outermost positions of the eyeball are only attained under continued jerks, and cannot be continuously maintained, it will be better to have recourse to the following operation, viz., the insertion of the paralyzed muscle *is to be brought forward, a partial tenotomy of the antagonist being made at the same time.* This operation is therefore to be performed in those cases in which the want of mobility exceeds 1-1½ line, but ranges between this and 2–2½ lines. *When it exceeds these limits we must layer the paralyzed muscle forward and at the same time make a complete tenotomy of the opponent.*

Our object in bringing the insertion of the paralyzed muscle more forward is to furnish it with an increased power over the eyeball. For we give it mechanically a more anterior (and therefore a more favourable) *point d'attaque.* We have before pointed out that the eyeball is to be considered a globe, the centre of which being fixed, its movements can only be rotations around different axes; if we now

give one muscle a more anterior insertion than its antagonist it must exert a greater power over the eyeball than the latter, and therefore pull it more over to its own side. In the same manner we can correct any dynamic deficiency in the action of one muscle, and the consequent asymmetry of the position of the eye by giving the partially paralyzed muscle a more favourable (*i. e.* anterior) insertion, and we can thus once more equalize the power of the two antagonists. Although the effects of this operation are most excellent in the majority of cases, there are yet a number of circumstances to be considered and weighed which may materially modify the ulterior beneficial results. After a time the paralyzed muscle generally undergoes a fatty degeneration, and this would render it unfit for the requisite amount of contraction even if the innervation were normally restored, and this degeneration also modifies the effect of bringing forward the insertion of this muscle very considerably, so that for a short time after, there may indeed be a tolerable balance of power owing to the more passive opposition of the paralyzed muscle, but after a time the muscle will sometimes yield more or less to its healthily innervated opponent, and the eye will then deviate towards the side of the latter. But we have the following facts to guide us in our prognosis. If a complete paralysis has existed for several years without any considerable contraction of the antagonist having supervened, it may be presumed that it will not occur at a later stage. But if a secondary contraction does exist, the further increase of this will be obviated by the tenotomy of this muscle, for by doing so we increase its burden, or in other words decrease its power. If, however, in spite of all our care, the original effect of the operation is lessened by these changes, we may repeat the laying forward of the paralyzed muscle or the tenotomy of the opponent, or divide the latter operation between the two eyes. Von Græfe therefore advises that in these cases the effect of the operations should at first appear excessive, so that the medium position of the eye appears after a week to be still moved

towards the side of the layered-forward muscle to the extent of $1\frac{1}{2}$—2‴; after 4—6 weeks but little of this excess will be apparent, and at the end of six months it will have disappeared altogether.

In cases of total paralysis we cannot therefore give so favourable a prognosis as in those in which a portion of mobility has returned in the paralyzed muscle, for in these we obtain most excellent results. We not only afford the affected muscle a more favourable *point d'attaque* by bringing its insertion more forward, but also lessen the power of the antagonist by a more or less extensive tenotomy, and we thus not only remove the arc of mobility into the middle portion of the field of vision but even extend it considerably.

We must next explain the manner in which this operation of "layering forward" the paralyzed muscle is to be performed. As it has been but very seldom performed in England, and as great accuracy in carrying out the details is essentially necessary to its success, I think it better to give a translation of von Graefe's description of his operation.

In describing *the layering forward of the paralyzed muscle together with a partial tenotomy of the antagonist (by which the latter is but inconsiderably weakened)*, he says.* "For this purpose I detach the paralyzed muscle from its insertion in the same manner as in the common tenotomy operation, with this difference only, that after the detachment, I, with a pair of Cooper's scissors, also sever pretty far back any loose adhesions (if any such exist), between the posterior surface of the muscle and the sclerotic, and also incise the connective tissue somewhat on each side of the muscle. Although I make the conjunctival wound somewhat larger than in tenotomy, it must not be extensive, I however loosen the textures between the *conjunctiva* and the anterior surface of the muscle more than in that operation. Though the muscle will still indeed (as in tenotomy) adhere by its lateral attachments it will yet, together with the layer of cellular tissue, permit itself to be freely and extensively slid either in a forward or backward direction upon the sclerotic. Owing to this fact, a retrogression of the muscle (Rücklagerung) of unusual extent would ensue, if the eye were left to itself. But if instead of this, we on the contrary desire to bring about a shifting of the muscle *towards* the *cornea*, it will be necessary to take care that the eye be turned completely into the corner corresponding to the detached muscle, and that it

* Archiv., vol iii, part 1, p. 341.

be there immovably retained until the muscular layer becomes attached to the surface of the sclerotic in the desired position."

"Just as the detached muscular layer slides back *in maximo* upon the sclerotic when the eye is turned into the oposite angle, will it glide *in maximo* towards the *cornea*, if the eye is turned towards the side of the operation, so far indeed that it may even, if desired, be made to lie upon the *cornea*. With respect to the *cornea* we need not fear such an excessive layering-forward. In cases of *strabismus divergens*, after paralysis of the *oculomotorius*, I have sometimes turned the eye so far into the inner angle, that quite the inner third of the *cornea* was covered by the detached muscle. Adhesion appears to be prevented through the epithelial layer of the *cornea*; afterwards the muscular layer always retracts behind the edge of the *cornea*, most likely owing to the cicatrization in the subconjunctival tissue which lies behind it. It must however depend upon the individual lesion whether or not we desire to bring the muscle forward to so great an extent. After the first part of the operation, viz., the detachment of the paralyzed muscle and its layer of connective tissue is finished, I pass on to the second part of the operation, which concerns the antagonist."

"I make, just as in tenotomy of the latter, a small conjunctival wound, and just as small a wound in the subconjunctival tissue, and then draw forth the tendon with a *strabismus* hook. It is not necessary that the hook should sustain the whole breadth of the tendon, but only sufficient to afford a firm hold during the application of a suture, and also to present distinctly the conditions of the situation of the insertion. I now pass a curved needle, with a silk thread beneath one margin of the tendon, and pierce the latter close to the sclerotic, from behind forward, in such a manner that the thread embraces a good half of the tendon, I then tie the suture also close to the sclerotic and give the two threads to an assistant with the direction to draw them gently towards the opposite side (the *cornea*), whilst I myself draw the tendon away from the sclerotic towards the angle of the eye by means of a hook. In this way the part of the muscle which lies between the suture and the hook is put upon the stretch, and may with a pair of scissors be divided about $\frac{3}{4}$ of a line behind the suture, without any fear of injuring the latter. That half of the tendon which is constricted by the suture, still better $\frac{2}{3}$–$\frac{3}{4}$ of it, will be at least divided; indeed this should be regulated according to the amount of the resistance which we anticipate from this muscle in the lateral movements of the eye. Should the patient complain of an annoying sensation of tension during the movement of the eye, the hook must be once more introduced beneath the undivided portions of the muscles and these with the exception of a few fibres, are to be cut. As the operation lasts far longer than a simple *strabismus* operation I recommend the use of chloroform. Shortly after the operation, or at all events a quarter of an hour after it, the dressing is to be applied; the eye having been properly cleaned and the patient after he has recovered from the chloroform having been comfortably placed in bed. The object of the dressing is, as has already been explained, to keep the *cornea* during 24–36 hours immovably fixed in the corner of the

paralyzed muscle. The thread which is passed through the tendon of the antagonist serves to do this. In order not to call up any reaction the dressing should be so applied that the *cornea* remains untouched by it; moreover the closure of the lids should be possible without the thread being pressed into the intermarginal portion of either lid. To attain the former *desideratum* the thread must rise up somewhat perpendicularly from the place of its implantation; if the eye is to be turned inwards we cannot desire a better support for the thread than the bridge of the nose. The great extent to which the *cornea* is inverted will in this case also protect it. In case the nose should not be sufficiently high, an artificial support may, by means of a roll of plaister, be applied against it side. Upon the cheek of the opposite side of the face the thread is to be kept in the desired position by strips of plaister. In order to prevent any shifting, it is best to lay one strip of sticking plaister about 2 inches long over the course of the thread, press the plaister firmly down for a few minutes and then fasten it by means of some cross strips.

Any other fastening is hardly necessary. Should the thread however, after having been attached in this manner, press in between the edges of the lids when these are closed, it will be necessary either to choose some other point of the bridge of the nose as *hypomochlion*, or if the thread slips off from this, we may retain the former spot, but change the direction of the thread in the proper manner, by means of a loop of plaister placed between the eye and bridge of the nose and fastened on the forehead or cheek. If the eye is to be turned into the outer corner, it will be necessary to make use instead of the nose of an artificial elevation, made of a roll of plaister, The roll is to be applied to the outer edge of the orbit and steadied by means of similar rolls of plaister coming from the temple. As displacement occurs very easily, the dressing is in this case somewhat troublesome.

"The patient should remain quietly in bed until the thread is taken out, and the attendant should be watchful that the dressing does not shift. Should this however occur, it must be at once remedied and it is advisable that the Surgeon should himself do this."

(2.) *Bringing the insertion of the muscle forward together with complete tenotomy of the antagonist (by which the latter is considerably weakened.)*

"The first half of the operation remains the same; the paralyzed muscle with its layer of cellular tissue is to be made to slide upon the sclerotic in the manner above detailed. On the other hand, we pass a larger hook beneath the whole breadth of the tendon of the antagonist, we then take a silk thread at each end of which is attached a curved needle. We thrust, from before backwards, one needle through the middle region of the tendon but nearer one edge than the other, and pass it out at the free edge of the tendon; it should embrace a good third of the breadth of the tendon. The second needle should be passed to the other side in a symmetrical manner and the suture be tied close to the sclerotic. Within it will lie the two external thirds of the tendon, whilst the inner third is excluded. The tendon, in its whole extent, is then to be divided between the hook and suture. The purpose of the suture here recommended is to avoid its being prematurely

torn out. This purpose is here particularly needful, as we apply the mode of operation in question in those very cases in which the turning of the eye offers very considerable resistance, viz., contraction-paralyses. In order that such a suture should fail, either the two outer portions of the muscle must separate, or the portions of the muscle between the two places of puncture must be destroyed lengthways and the thread then slips off. If we only encircle the muscle, the suture very easily slips off; the premature detachment of the suture is less surely provided against if we transfix the muscle at one point than if we pierce it at two places. The dressing should be the same as in the last case."

A few words will suffice as to the after treatment.

The pain caused by the dressing usually soon subsides, should it however prevent sleep, cool water dressings may be periodically applied, but only as long as they are really necessary, as they tend to loosen the dressing. *Œdema* of the upper lid without any conjunctival irritation is of no consequence. As a shifting of the dressing within the first 8—12 hours may completely frustrate the object of the operation, it is necessary for the operator to see the patient frequently during the first twelve hours. The thread must remain in 20—24 hours, but if the patient has no pain, it may be kept in 36—48 hours.

In the second class of cases, where the antagonist has undergone secondary changes, and a variable amount of paralysis remains, our treatment must also be modified and varied according to the peculiarities and exigencies of each case. If the paralysis has given rise to a *strabismus concomitans,* but the original paralytic affection has eventually quite disappeared, we must treat this exactly as a common case of *strabismus concomitans,* and be guided by the same rules as hold good in that affection.

For illustration's sake, let us again suppose a patient affected with a paralysis of the left *abducens.* After this has existed for some length of time, there will arise, on account of the diminution in the opposition of the *abducens,* some changes in the elasticity of the *R. internus,* and changes of its structure will soon follow in their train. The deviation inward will increase, and the *diplopia* will extend more and

more into the right half of the field of vision, and then when the paralytic affection has been successfully cured, and the mobility in the direction of the affected muscle has been restored, we find a well-defined *strabismus concomitans* remaining. At this period it is often exceedingly difficult to ascertain with certainty whether or not a paralytic affection has previously existed.

At a somewhat earlier stage, however, whilst there are still some symptoms of the paralysis remaining, we can readily trace the differences between them and the symptoms of *strabismus concomitans* developing themselves. I have before pointed out how this mixture of symptoms can be unravelled. In these cases where the original paralysis has gone over into *strabismus concomitans*, and the paralytic character of the affection is almost completely lost, I repeat that we must operate as in an ordinary *strabismus concomitans*.

I have before stated, that if the eye affected with the paralysis enjoys the better sight of the two, and is used by the patient in preference to the other, a *strabismus concomitans* may arise in the latter.

Let us again assume that the *abducens* of the left eye is paralyzed. This eye enjoys, however, the best vision, and the patient, therefore, in spite of the inconvenience, uses it in preference to the right eye. A secondary angle of deviation will arise in the right eye, and this angle will be greater than the primary. In time, the right *R. internus* will undergo changes in its structure, and become secondarily contracted. We shall now have a *strabismus convergens concomitans* of the right eye after a paralysis of the *abducens* of the left.

How are we to treat this?

Let us suppose that the deviation of the right eye amounts to 2 lines, and the defect in the mobility towards the side of the *R. externus* of the left eye $\frac{3}{4}$—1 line. At the first glance it might appear best to perform a tenotomy of the *R. internus* of the right eye. A moment's reflection will point out the disadvantage of such a proceeding.

Towards the left side of the patient there is a diminution in the mobility of the left eye in consequence of the paralysis of the *abducens*. If we now divide the tendon of the *R. internus* of the right eye, we shall also render the movement of this eye over to the left side difficult, and the associated movements towards the left will be executed with difficulty with both eyes; those towards the right will on the contrary be rendered abnormally easy. In consequence of this the patient will carry his head turned towards the left, in order to avoid the necessity of turning his eyes in this direction. For this reason it will be better, therefore, to divide the operation between the two eyes, and make a slight and carefully executed tenotomy of both *RR. interni*.

We should now have to speak of the operative treatment of those cases in which the paralysis has given rise to a *strabismus periodicus;* but as I shall in future pages enter more fully upon the subject, I must, in order to avoid repetition, defer its consideration until that time.

We find a great variety of forms in those cases which present a mixture of the symptoms of the remaining paralysis, and the supervening development of *strabismus concomitans;* they vary according to the extent of the restitution in the paralyzed muscle, or the secondary contraction of the opponent.

If the paralysis remains complete, and the secondary contraction of the antagonist goes on progressing, it will at length pass over into *contraction paralysis.* In the latter case we must layer-forward the insertion of the paralyzed muscle, and perform a complete tenotomy of the antagonist. We must not, however, be too sanguine in our prognosis, for in some cases we may have to operate more than once before we arrive at a very favourable result. A great amount of mobility often slumbers beneath the fibrous degeneration of the antagonist. In order to illustrate this, von Graefe mentions the case of an old woman whose *corneæ* were almost immoveably buried beneath the *caruncul*æ; after being three times operated upon (twice the operation of

layering-forward, together with tenotomy was performed, and once a single suture operation)*, the optic axes were almost parallel, and a free mobility existed throughout the greater part of the field of vision.

In those cases in which the paralytic affection has been partially cured, but with a secondary contraction of the opponent, we must be guided in our operative proceedings by the individuality of each case. Our chief aim must be to lighten the burden of the paralyzed muscle by means of layering its insertion more forward, and by weakening its antagonist by tenotomy; and our end purpose to confine the *diplopia* to the peripheral portions of the field of vision and expel it from the central portion. I trust that I have explained this part of the subject sufficiently to render it an easy matter for the reader to adapt or modify the treatment according to the exigencies of each individual case.

Let us now shortly consider to what operation we must have recourse when the double images show not only lateral differences but also differ in height. Here the considerations are more complicated, and must be well weighed before we decide upon an operation. As an example of this class of cases, let us assume a paralysis of the left *O. superior* with a secondary contraction of the *O. inferior* of the same eye. The reader will remember that such a case would present the following symptoms. Beneath the horizontal median line the left eye will, owing to the paralysis of the *trochlearis*, stand higher than the right eye, and will also deviate inwards, so that the double images will differ in height and be homonymous; the *pseudo*-image will be *beneath* and to the left of the image of the right eye, and this difference in the height of the images will increase as the eyes are moved towards the right side of the patient and decrease in the opposite direc-

* This suture operation is thus performed. Before the tendon is divided a thread is drawn through it, and the eye is turned by means of this suture towards the opposite side for 24–36 hours. This operation is sometimes advisable in cases of partial paralysis of the *R. internus*, which threatens to pass over into the *strabismus divergens*.

tion. Above the horizontal line there will be a divergent squint, for owing to the contraction of the *O. inferior* the left eye deviates upwards and outwards, the double images will consequently be crossed, the *pseudo*-image will lie beneath that of the right eye, and the differences in the height of the images will also increase towards the right, and decrease towards the left side.

While deliberating upon the operative treatment of such a case, we must remember the fact that double images which show a twofold difference (laterally and in height) will often unite if one of these differences only is corrected. We have mentioned this when speaking of the choice of prisms, and have pointed out that if the differences in the height of the images are corrected, the lateral differences are often annulled by the spontaneous action of the *R. internus* or *externus*. Here I must, however, refer to another fact, viz., that even if after the correction of the differences in the *diplopia* in one direction (say in height) by means of prisms, the lateral differences should persist, we sometimes find that the latter will disappear after an *operative* treatment of the former.

Suppose, then, that we find that the differences in the height of the images are the chief disturbing causes to our patient, we must by our operation endeavour to equalize the height of the two eyes. This may be done either by lowering the left eye, or elevating the right. In the former case we should have to divide the *R. superior* of the left eye. What would be the result of such an operation? The lower position of the left eye (through insufficiency of the *R. superior*) would occur chiefly when this muscle is called into action, *i. e.*, upon looking upwards. This would not, however, be favourable to the patient, for it is essentially necessary that the lower half of his field of vision should be nearly free from *diplopia*, as for all the common purposes of life our optic axes are directed slightly downwards or straightforward, and we must therefore endeavour to equalize the differences in the height of the double images chiefly for

this portion of the field of vision. This may be done by dividing the *R. inferior* of the right eye, and thus elevating the latter. The right *cornea* will then stand higher through the vertical extent of the field of vision. The insufficiency of this muscle would show itself most when the patient looks downwards, therefore just in that direction in which we particularly want to equalize the height of the *cornea*. The differences in the height of the double images were found to be greatest when the eyes were moved over to the right. The inefficiency of the *R. inferior* dexter in lowering the *cornea* will also be most conspicuous in this direction, for it will be remembered that this muscle exerts most influence upon the height of the *cornea* when the eye is turned outwards (to the right).

I have only just touched upon this subject here, so as to give the general rules of treatment in such cases.

Periscope of Foreign Ophthalmology.

TRANSLATIONS AND ABSTRACTS OF IMPORTANT PAPERS PUBLISHED ABROAD.

By Dr. J. Soelberg Wells.

*DISEASE OF THE CHOROID, VITREOUS HUMOUR AND RETINA IN BRIGHT'S DISEASE, TOGETHER WITH A PECULIAR FORM OF EMBOLUS.**

By Heinrich Müller.

The attention of pathologists having of late been so much directed to the changes which the structures within the eye undergo in the amaurosis accompanying Bright's disease, a short account of a paper upon this subject by such an authority as H. Müller, will I am sure prove acceptable to the profession.

Hitherto descriptions have only been given of the changes which occur in the retina in morbus Brightii, Müller however, has observed not only changes in the retina, but also in the choroid and vitreous.

In a young man who died of granular atrophy of the kidneys, with dropsy, and in whom a marked amblyopia had shown itself, Müller had the opportunity of examining the eyes and noticing the following changes, (one eye was examined fresh the other after having been hardened) :—

1. The choroid was thick, strongly pigmented, but with the exception of some whitish stripes, it did not to the naked eye seem particularly changed in appearance. In these situations, however, as well as in some others, a microscopic examination showed in both eyes extensive changes in the blood vessels.

The walls were thickened by a homogeneous mass, which refracted light very strongly, while the veins were here and

* Würzburger Medicinische Zeitschrift, vol. i, part 1, 1860.

there but slightly changed; several branches of the posterior ciliary arteries were most extensively implicated, and particularly most frequently and intensely there, where covered by the vasa vorticosa, they give off, from the equator of the eye up to the neighbourhood of the ora serrata, branches which pass over at once into the choriocapillaris. From these points the changes appeared not only to proceed towards the capillary expansion, but also backwards towards the branches themselves; there the irregularity in the changes was also most marked, so that the condition of the walls of vessels lying close together varied exceedingly, and owing to this the radiations of the ultimate arterial twigs acquired externally a peculiar beaded appearance. Müller, found that here, through thickening of the walls inwards, the vessels were narrowed, or even completely blocked up. This occlusion varied very much in extent, and between these portions of vessel clefts and cavities of various shapes existed. As a rule but few blood-corpuscles were wedged into the occluded portions, and this was evidently owing to the opportunity of turning aside, which was afforded them by the numerous communications. In this way (as was also noticed in a former case) quite solid hyaline stringy masses had sometimes been formed, whose thickness varied up to 0·05 mm.; here and there, however, a thick mass of blood-corpuscles might be seen wedged into the closed portion of vessel, which was then sometimes sinuously dilated.

The successive thickening of the walls did not, however, seem to be the only mode in which the arterial twigs were occluded, for this appeared to be brought about also by the coagulation of a substance filling the vessels. For in arteries of about 0·06 mm. in size, longish plugs were met with, which upon pressure detached themselves from the walls of the vessel and split up, further on they passed however into softish masses, which sometimes contained blood-corpuscles in greater or less quantity, sometimes however the column of blood was completely interrupted. Some portions were quite homogeneous, others contained small celled vesicular or drop-like bodies. Müller thinks that although these may have partly originated from the colourless blood-corpuscles, they may also in part be most certainly traced back to the epithelium of the blood vessels. "Even normally the epithelium of the ciliary arteries is generally very strongly developed, and consists of very long spindles. In the choroid in

question (even in the hardened eye) it was often loosened and detached, and in conjunction with this, numerous young round cells were formed, in such a manner indeed, that an hypertrophy of the epithelial cells appeared most probable. At all events, a fatty degeneration of the same was very evident, for the spindle-shaped cells could be seen filling themselves with globules, swelling up and becoming ventriculous."

"These different masses which occurred in the larger arterial branches, such as detached and degenerated epithelial cells, young cells and free masses of fat, were here and there wedged into the smaller twigs. In this way a peculiar form of embolus arose, which is distinguished by occurring quite peripherally, since the produce of the arteries which are themselves already very small, is at once wedged into the capillary branches. Even in appearance this obturating mass distinguished itself through the large fat globules, from the finely granular substance, which we find in the vessels of the choroid and retina in intense (particularly metastatic) inflammation of the eye. We must not, however, even in the latter case, at once take the endocarditic origin of this mass (which is found, quite similar in appearance, also on the outside of the vessels) for granted; I have before pointed this out, and more lately Virchow has also agreed with this view." Müller thinks, however, that the occurrence of embolus in the case before us should not be invested with too much importance, as it was only found in certain individual places, and no further consequences could be observed with certainty; the latter may, however, also be owing perhaps to the numerous anastomoses. He thinks also, that the fact of the fatty degeneration and embolus being wanting in many places must even give rise to the doubt whether we must not look upon it as a secondary process.

He also frequently found partly in the vessels, partly in their neighbourhood, irregular yellowish-brown lumps, such as otherwise originate from the colouring matter of the blood. Although a part of these masses may have been brought about through stagnation and metamorphosis of the blood, similar appearances indicating an infiltration, were also present in situations where neither degeneration nor embolus occurred, and no particular obstructions existed, so that we must suppose that disturbances in the nutrition may have even occurred beforehand. The fact that the pigment epithelium of the choroid, which was otherwise well preserved, adhered

a vesicular-form nucleus, that he thinks this no longer normal, but is inclined to place it in the same class with the changes in the nerve fibres.

d. The walls of the blood vessels, varying in size from small arteries to proper capillaries, were found changed in tracts of various sizes, they were partially irregularly thickened through an homogeneous opalescent mass, which finally occluded the channel completely. In the substance of the walls of some of the vessels dark fatty-like granules were inserted, whose seat did not however appear to be in the epithelium. No reaction was obtained with the iodine-sulphuric acid test.

Müller, however, calls attention to the fact, that a similar thickening and homogeneousness of the walls of the vessels, with a diminution of the lumen, is also met with in other inflammatory processes in the retina, in which we do not suspect any constitutional affection.

e. Most extensive heterogeneous deposits of different kinds were found amongst the elements of the retina. In the nests of the hypertrophied fibres of the nervous layer, also between the ganglion cells, but chiefly in the granular layer, numerous granular globules were found, which partly contained largish fat drops, partly very fine dim granules, appearing very dark by transmitted light, but when viewed by reflected light they seemed intensely white. Their form and size varied considerably, sometimes they appeared like small irregular lumps, at others like round cell-like bodies, which were considerably larger than the so-called granules of the retina, and at times even longer than the ganglion cells (0·02—0·03 mm.). Müller thinks that these granular lumps are chiefly composed of fattily degenerated retinal elements; their position speaks against their being larger ganglion cells (although these may also indeed be sometimes fattily degenerated).

Secondly, extensive masses of evidently new formation were found embedded, especially in the intergranular layer. The latter forms, its perpendicular fibres being crowded apart, a number of locular compartments, whose diameter may reach 0·2 mm., and which communicate when they are crowded very closely together. They are filled with most polymorphous masses, hyaline globules and drops, which reflect light very strongly, large colloid lumps containing transparent drops, or darkly granulated throughout; others

consist of a confused mass of very distinct small fibres, or a coarse scaffolding of an homogeneous or granularly-striped substance.

The iodine-sulphuric acid test had no effect. They generally resisted, partly very strongly, the action of acetic acid or alkalies.

At one part there was an undoubted relation between these masses and the above-mentioned extravasations, for here and there compartments were found completely or partially filled with blood, which could clearly be seen to have come from the inner layer. It would appear as if sometimes in the hæmorrhagic infiltration of the internal vascular layers the fluid portion alone reaches, through a kind of infiltration, the intergranular layer.

This collection in the intergranular layer, which is most extensive in the neighbourhood of the macula lutea, and diminishes from thence throughout the fundus of the eye, coincides with the normal condition of the retina; for the intergranular layer is particularly developed around the macula lutea, appearing here as a thick layer; and being distinguished by its softness, it allows itself on this account to be easily pushed aside.

In successive sections, Müller was enabled to trace a streak of blood from the neighbourhood of a vessel in the inner layers into the intergranular layer, where it spread out into a largish extravasation. Nearer the equator of the eye these deposits in the intergranular layer ceased, but on the other hand the radial fibres which abut upon the limitans were between the latter and the slight nervous layer, crowded asunder here and there by an homogeneous fluid, so that they appeared to traverse compartments in the form of delicate columns.

At the entrance of the optic nerve an opacity was observed which might perhaps be due to a deposit. At the boundary of the nerve and cell layer a thin opaque streak could (in hardened sections) be observed, in the former it extended somewhat further from the entrance of the optic nerve than the diameter of the latter. The nature of this streak did not appear very clear to Müller. The deposits in the intergranular layer were very insignificant.

The nervous layer was, however, very much thickened, the walls of the vessels were somewhat thickened, even quite into the optic nerve.

Müller regrets that the paper of Liebreich upon the ophthalmoscopic appearances in Bright's disease (Archiv vol. v, part 2), had not appeared at the time of his examination. He thinks that the grey opacity at the entrance of the optic nerve, may be dependant upon the "nerve mass" itself, whereas the "white wall" is for the greater part most likely not only due to the granular cells, but also to the extensive deposits in the intergranular layer described by Müller.

more firmly to the choriocapillaris at the affected spots, so that it could be less easily detached, may perhaps stand in some connection with this.

In the stroma of the middle choroidal layer, between the larger vessels in the anterior half of the choroid, largish round cells were met with; these appeared sometimes to be in the commencing stage of fatty degeneration.

"Finally we must mention that in the stroma between the larger vessels, as well as in the suprachoroid (which was very much developed), on the one hand an unusual number of fibres were seen which were supposed to be unstriped muscles, on the other some peculiarities were observed in the ganglionic nervous plexus, to which I shall recur hereafter."

2. Vitreous Humour.

In the fresh eye Müller observed nothing particular, in the hardened eye, however, he met with a peculiar whitish opacity on the external surface (corresponding to the fundus), which presented great peculiarities on microscopic examination.

"On the one hand the cells of the vitreous were more numerous than normally, varying in size up to 0·025 mm.; some were round, others showed processes, some contained hyaline drops, which however also occurred free (through dehiscence)." These cells were evidently undergoing a process of hypertrophy, for large vesicular-form dividing and double nuclei could be seen."

Besides this, other formations were found in great quantity. These were small rods, at the utmost about 0·001 in breadth, and of very varying length; the shorter ones had frequently a more considerable but uniform thickness, whereas the larger ones were generally strongly pointed at each extremity. The larger ones were often somewhat bent and could by shifting, etc., be entangled into a coil; they were evidently pliable and not brittle; at one time they might be compared to fat crystals, at another, to spindle-shaped spermatozoa. That they were not fat crystals was proved by their not disappearing after having been treated for some hours with ether; glycerine had also no effect, nor did acetic acid change them; they disappeared however after being treated for some time with potash. Müller considers them as a pathological formation in the vitreous, dependant upon a diseased condition of the neighbouring parts; he thinks

that the extent of their occurrence is a proof of this, for they were only found near the hyaloid of the fundus of the eye, and were wanting in the depth of the vitreous, and more anteriorly also at the periphery. The hypertrophy of the cells extended somewhat further forward in the vitreous than the rods. It is however worthy of notice that the implicated portions are just those which lie closest to the most diseased portions of the retina.

3. Retina.

The fresh right eye being divided in the equator, presented to the naked eye a great number of partly white, partly red spots; one blood speck lying yet in the macula lutea, while others extended up towards the equator. The retina was evidently more opaque than usual, more particularly towards the entrance of the optic nerve; on account of this opacity a little pit, which existed just here, was very evident even to the naked eye.

Upon a microscopic examination the following changes were noted in the retina:—

a. An unusual resistence of the elements and capability of being isolated, so that although the body was already much decomposed, the bacilla and cones could, together with the granules and fibres appertaining to them, be beautifully demonstrated. Individual radial fibres with their nuclear dilatations, and a number of granules and bacilla adhering to them, could be isolated as well as if the retina had been slightly hardened; perpendicular sections could also be made without any further preparation. The granular cells which are generally not easily demonstrated, could also be well seen.

As Virchow and Müller have seen this peculiarity in the retina in other cases, the latter thinks that we are perhaps justified in attributing it to a peculiarity of nutrition. The importance of this resistance and capability of isolation must however be only relative, as we find this differing a good deal not only in different individuals but also in animals.*

He thinks also that the diffuse opacity is most likely dependant upon this condition, which is apparently often also found in situations where no heterogeneous deposits have yet taken place.

* We may call this, with Virchow, sclerosis.

b. Extravasation of blood. Clusters of blood-corpuscles were found lying in those places which presented a slightly reddish-striped, or punctuated appearance, chiefly in the nervous layer, or those lying next to it. The more intensely red spots were formed by more aggregated clots of blood, which had partly advanced into the granular bacillar layer.

Müller also points out the fact that, particularly in the intergranular layer, largish hollow spaces easily arise, which are completely filled with heterogeneous masses and, as several of these compartments contained pure fresh blood, whilst in others a metamorphosis of the blood had already set in, he considers that these effusions differed most likely in age. In the one eye he found at the yellow spot, between it and the somewhat detached hyaloid, a little heap consisting of blood-corpuscles and granular masses, evidently produced by a retinal hæmorrhage which had burst inwards.

c. Nests of ganglion cell-like bodies, which proceed from hypertrophied nerve fibres. Although these peculiar bodies imitated also in this case most closely ganglion cells with their processes, Müller still retains the same opinion with regard to them, which he expressed in a former paper.*

Here also their position spoke for their being hypertrophied nerve fibres, for the chief mass of them, in fresh as well as hardened preparations, did not appertain to the layer of the larger ganglion cells but to the nerve fibres. Where these nests are so much developed that they extend through the whole thickness of the nervous layer, and crowd this (increased to several times its normal thickness) forward against the other layers, it easily happens that the limits between the undoubted ganglion cells and the ganglio-form varicosities become obliterated. In some places we may, however, see the latter separated from the real cells by normal bundles of nerve fibre, and these may be seen distinctly to pass over them as such. Besides this, all the transitions of form, from normal nerves into the ganglio-form bodies, could here again be closely followed; and many nerve bundles appeared for a certain distance simply broader and beset with greater varicosities than is normally the case. These dilatations also sometimes assumed very much the appearance of extended non-nucleated cells, and as these appearances link themselves closely on to those described by Müller in a former case, he thinks himself justified in the supposition that they are to

* Græfe's Archiv, vol. iv, part 1, p. 41.

be placed in the same class of pathological changes. In our case, after becoming much distended, these varicosities only exceptionally remained without a nuclear-like body. These apparently nucleated bodies which were also very much extended in length were however only very varicose fibres; in no case could the nuclear-like bodies be described as undoubted vesicular-form nuclei, but rather as roundish lumps, which, darker than the surrounding substance, were at the same time opalescent.*

But Müller thinks, that these bodies are certainly not to be considered as altered cells of the ganglion layer of the retina. This does not, however (as he points out), exclude the probability that these bodies may be found to have a certain relation to nerve cells; he at the same time recalls our attention to certain facts, viz., the presence of peculiar nodules which he has found normally in the ciliary muscle,† and the nature of the choroidal nerve texture (*vide* his paper on unstriped muscles and nerves of choroid, Würzburger Verhand. vol. x, p. 179), in the amblyopic eye before us. In the pale nerves of the choroid those situations which contained nuclei were often swollen, and in the foci of these webs such numerous groups of nuclei were seen as Müller has never before met with.

The whole development of the ganglionic choroidal plexus was besides this of such a nature, that the question of an hypertrophy of the nerves naturally arose.

Müller could not with certainty demonstrate any hypertrophy in other portions of the nervous elements of the retina trunk of the optic nerve, ganglion cells, etc., the latter appeared sometimes somewhat larger than natural, but he could not see an hypertrophy with opalescence as in the nerve fibres. The fibrillæ of the cones were however in the yellow spot of the one eye so large and opalescent, that they looked almost like the cones themselves, and the granules of the latter were such large, distinctly bipolar cells containing

* On the application of carmine, Müller found that these varicosities become very red, the nuclear-like bodies assuming a still darker dye so that they presented still more the appearance of cells. It is however a well known fact (as M. points out) that the normal nerve fibres of the retina, as well as axis-cylinders which have been isolated from the white tubular fibres become coloured in the same way. In very broad nerve fibres (*e. g.* of fish) we may demonstrate varicose axis-cylinders of enormous breadth which appear quite similar to those in Bright's disease.

† Würzburger Verhand. vol. x. page 1[illegible]7.

Ophthalmic Hospital Reports,

and Journal of the

Royal London Ophthalmic Hospital.

Edited by J. F. Streatfeild.

Number 13. *October*, 1860.

Further improvements and some important alterations will be carried out in future numbers of the Journal. The work will be conducted by the Council, by whom it was commenced three years ago, when the first October number was published at Moorfields, but from this time I do not continue in sole charge of the publication.

J. F. Streatfeild.

Various Observations.

DIAGRAMS IN OUTLINE, FOR REPORTS OF CASES.

In this number some specimens of blank forms which I have prepared for sketches of eyes are introduced, for facility of note-taking in ophthalmic practice. I have myself, for a long time, been in the habit of making rough drawings on the hospital tickets, or among my notes, to illustrate the general features of any case in which it seemed probable that it would be important to recollect the appearances and the relations of the parts at different times, and afterwards to compare their actual state with that which had been seen before; which, instead of a sufficiently accurate description, *in words*, of its original condition and of its progress, took me less time to execute, were more true, and were also very easily understood when again referred to by me in the treatment of the case, during which these rude designs would, almost alone, give its complete history. These illustrations

were very unfinished, or I could not have done them so rapidly as to gain one of the chief objects I had in view. I have adopted them for the explanation of appearances, whether *external* or *ophthalmoscopic*. For pathological *dissections*, a simple outline of the eye, seen in section, makes a third in the series now published (Plate XIII, *a*.)

Two curved lines would serve to indicate the margins of the lids, and a circular outline the cornea in my common way of illustration. (The form No. 1 is equally available for the right or left eye,* the addition of the rounded caruncle at one or other corner, in commencing the sketch, will explain which eye is meant. The whole figure is divided with light lines into fourths, to make the drawing easier; the pupil, moreover, is faintly shewn; but if it is an abnormal feature in any case, the outline in printing ink can hardly be confused with the pen or pencil marks). Within the corneal outline the shape and size of the pupil is soon sketched, and if then artificially dilated, any abbreviation of the word atropine would record the fact of its having been used. The position and size of an ulcer of the cornea, or of a leucoma, can be noted in this way much more quickly than in writing, which, moreover, can be interspersed with the sketches to any extent desirable; it might, for instance, be necessary to mention whether any mark made within the outline of the cornea indicated an ulcer *or* a leucoma; but even then it is much more quickly and more accurately done than it could be by such a description in words of the state of the case. Any more important feature in any case, or whatever is uncommon or less likely to be understood, can be *carefully* drawn, but generally the drawing should not be made as if it was for publication, but only to note unmistakeably what has been seen, and then a finished drawing may be made from it at any time. At page 329 of the second volume of the journal, for instance, some outlines of iritic adhesions are rather more carefully represented than any such sketch, meant only for temporary use, need have been. A magnified scale ($\times 2$) is adopted for the three diagrams as, without a fine point and minute attention, these sketches cannot be otherwise made quickly and well; the size and shape of the pupil, for instance, bound by iridal bands, is not easily shown if it is to be no larger than the pupil itself.

For ophthalmoscopic sketches there has been for a long

* The numbering of the three diagrams will prevent any mistake of the right way upwards.

time in use by the draughtsman at Moorfields, papers prepared with circles left blank in the black bordering that is wanted for these illustrations. In the form No. 2 (Plate XIII, a) I have had fine lines introduced to divide the circle into quadrants for more easy comprehension of the relative places and extent of the objects discovered with the instrument. The centre of the circle may be given to the yellow spot, the optic disk, or any other part that is seen with the ophthalmoscope. In this diagram also, it is evident that, supposing *indirect* ophthalmoscopy is always used, without any verbal note, the drawing may be known to represent the right or left eye, whenever the *relative* positions of the yellow spot and optic disk are shown.

For dissections of eyes the form No. 3 (Plate XIII, a) is prepared. This diagram also, for the reason given above, is divided into fourths, the normal iris is also faintly marked. It is appropriate for antero-posterior vertical or horizontal sections. In the case of horizontal sections, the position of the entrance of the optic nerve (which is therefore purposely omitted in the figure) being marked in any case above or below the line dividing the two posterior fourths, will identify it as of the right or left eye, supposing that in every case the word upper or lower is added to the view of the section that is given. In vertical sections, unless any shorthand private mark is understood, the half of the eye in the drawing, whether it is of the right or left eye, must be put down in writing, and in the same way inner or outer should be recorded against it. For vertical sections of the eye, taken laterally, the form No. 2 may be perhaps also useful.

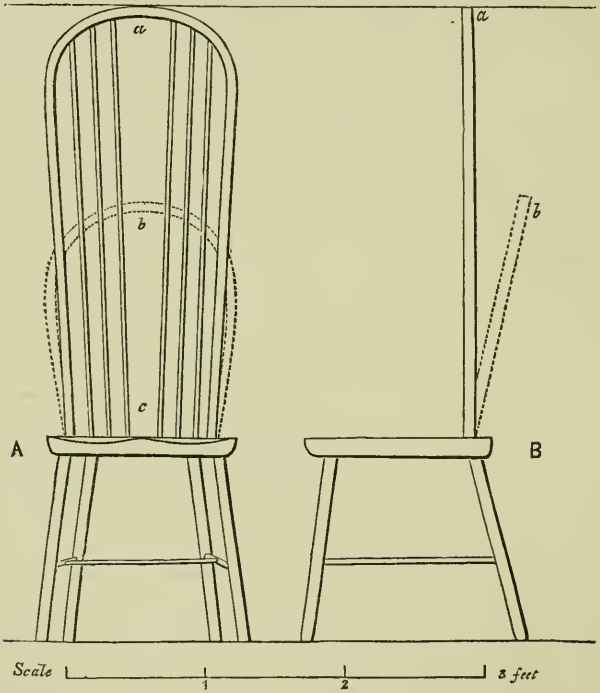
The adoption of these plans will much facilitate the records of ophthalmic practice, and they may be used in the publication of cases with great advantage, instead of the tedious description of changes seen at various times in the course of treatment.

The printer is ready to supply (by post) 50 *copies of the three diagrams together for Two Shillings. Application for them should be made to him.*

J. F. S.

A HOSPITAL CHAIR FOR PATIENTS IN OPHTHALMOSCOPY.

This modification of the common "Windsor" chair is one I have used at Moorfields, and perhaps it may be also found useful by others employed in the same way. I had it made some years ago as the simplest remedy I could think of for the disadvantages of any ordinary chair. It is all of wood, so it is easily kept clean; it is very strong and cheap. It only differs from the "Windsor" chair in the back (this part of



the common chair is shewn in dotted outline, *b. b.*, in both the diagrams, A. B., above given) which is perfectly upright, nearly double the ordinary height, and having its two centre bars widest apart and most widely separated above. The upright back keeps the patient's head steady and sufficiently forwards during the examination. It is made high enough to support the head of a tall man (at *a*), between the two centre bars, which, being approximated below (*c*), will be as convenient for the head of a child.

J. F. S.

THREE VARIOUS

DISLOCATIONS OF THE LENS.

By Dr. Wilson (*of Dublin*).

I.—Accidental Depression of an Opaque Lens.

R. M. C., a poor woman, æt. 60, in miserable circumstances, thin and spare, constantly exposed to the inclemency of the weather and other hardships, has been an occasional attendant at St. Mark's Ophthalmic Hospital for the last 17 years. She lost the left eye very many years ago; the globe is now collapsed, but the small remnant of cornea is still clear, and behind it may be seen a fragment of an earthy lens. On the right side the following appearances were noted 3 years ago:—cornea and anterior chamber normal; iris originally of a blue-grey, has lost its polish, and is tremulous; the lower segment of its pupillary margin is drawn slightly upwards, and attached to the front of the lens, which is dense white, and in some parts apparently of earthy consistence; upper portion of pupil free from adhesions. When the upper segment is contracted the patient is left in almost total darkness, and has to be led to the hospital, from whence—the pupil having been dilated with atropine—she is enabled to make her way unassisted, a large semi-lunar clear space being left above the edge of the opaque lens. When inspected in this state it is quite manifest that the lens has fallen below its normal situation, and is only held in its present position by its attachment to the edge, and possibly the back of the iris; the vitreous is believed to be fluid. This latter circumstance added to the wretched health of the woman, and the fact of her being able to follow her avocations when the pupil was dilated, were the reasons why no operation was attempted. She was supplied with belladonna, and only came to the hospital now and then to have the drops renewed.

About two years ago she received a blow on this eye, and when recovered from its stunning effects, she found to

her great surprise and joy that she could see much better than she had done for years previously. On presenting herself at the hospital shortly afterwards, the pupil was found circular and clear, the cataract had disappeared, and vision was good. It was evident the blow had detached some of the adhesions between the iris and the lens, and that the latter had fallen down below the level of the pupil. The conjunctival inflammation which followed the accident was soon removed, and the pupil kept moderately dilated; this latter is now small and slightly retracted; with a convex glass she can manage with difficulty to read. On ophthalmoscopic examination there is less brilliant reflection than in the normal eye, the optic papilla is very indistinct, and the vessels of the retina are small and scarcely traceable.

She says, that occasionally when stooping or bending her head forwards she loses her vision by an "amber-coloured" body coming from above downwards over the sight, but that by suddenly jerking the head upwards, vision is generally restored. When however, this remedy fails to restore the lost sense, her next and successful expedient is to place her left closed hand on the malar bone, and to strike it suddenly with the right fist, while at the same time she keeps her head thrown backwards; sometimes she sees something glistening like bits of gold. On making her look down, a pearly white body is seen in the bottom of the vitreous chamber, and by tilting the head forwards into a particular attitude, this body, which is the lens, is seen to move forwards on its axis into the pupil; its anterior and inferior edge is apparently attached to the back of the iris, and it moves on this adhesion as on a hinge; crystals of cholesterine have formed on it, and present a beautiful brilliant appearance; an analysis of these crystals by Dr. Aldridge was published in the "Dublin Quarterly Journal" for May, 1848.* Cases very similar to the above have been related by Ware in the second volume of his "Chirurgical Observations," and by Mr. Bowman in the appendix to his "Lectures."

II.—Subconjunctival Dislocation of the Lens.

P. B., æt. 60, a healthy countryman, got jammed in between two loads of hay, one of them being in motion, and was pushed violently forward towards the horse, which at the

* Mr. Wilde's Report on the Progress of Ophthalmic Surgery.

same moment jerked up its head from feeding. The point of the haimes struck his left eye, and the result of these two opposing forces was immediate loss of vision, and subsequent red discoloration of the whole eye. Such was the man's statement when he presented himself a week after the accident at St. Mark's Ophthalmic Hospital. He had then not even perception of light, and suffered a good deal of pain. The appearances were,—conjunctiva very red and vascular, cornea normal, anterior chamber partially filled with blood, pupil barely distinguishable, and of a horse-shoe shape, the base being superiorly. When the upper lid was elevated, and the patient desired to look down, a tumour was visible on the upper surface of the globe, and beneath the thin partially transparent conjunctiva which appeared from the injected vessels like a beautiful and delicate network; in shape and outline this tumour resembled the lens. The diagnosis being that the sclerotic was lacerated at or near its junction with the cornea, and that the lens had escaped through the opening, tearing at the same time the ciliary attachment of the iris, Mr. Wilde opened the conjunctiva over the tumour with a broad needle, and the lens, of a starchy consistence and light amber color, was evacuated. When all the portions were removed, the aperture in the sclerotic through which the lens escaped became apparent, being a black rent, communicating with the vitreous chamber. No vitreous humour followed; the eye was bandaged down, and the man experienced immediate relief from pain. When I saw him a week subsequently, the anterior chamber was clearing, also iris and pupil, which latter resembled that form which is sometimes seen after extraction where there has been loss of vitreous.

Perception of light and objects.—Two weeks subsequent to the operation the anterior chamber and iris were quite clear of blood; the wound in the sclerotic had healed, and vision was so far restored as to enable the patient with the aid of a convex lens to read large, and discern small type. In the 19th Plate of Sichel's "Iconographie," figure 4 represents this form of dislocation; it is also illustrated by Mr. White Cooper in the 16th volume of the "Medical Times and Gazette," and by Mr. Hulke, in the 6th number of this Journal.

III.—Dislocation of Lens into Anterior Chamber.

A. T. presented herself at St. Mark's Ophthalmic Hospital during the summer of 1859, complaining of a "sore eye." She stated that ten days previously she received, amongst others, a blow from the handle of a whip on or about the right eye, and that she fell on her face and became insensible. When she recovered she perceived something "wrong" with the eye, and since then she had had scalding lachrymation from it, for which she then sought relief. The right arm was broken. On examining the eye I found the conjunctiva slightly red and vascular, the cornea clear and brilliant, the pupil circular, but seemingly retracted; no evidence of any internal inflammation. After close examination I discovered in the anterior chamber the lens, apparently in its capsule, perfectly transparent and smooth without the least loss of substance; it completely filled up the chamber, except a small space at the upper part. On its anterior surface I detected, with the aid of a glass, a wave-like appearance, which I believe was owing to the presence of folds in the capsule. By moving the head into different positions, and allowing the light to play on it, its superior margin could be easily recognized by the reflection forming a semicircle on it. Vision was nearly as good as in the unaffected eye, but objects seemed to her slightly confused. I prescribed for the lachrymation and conjunctivitis, and advised her to guard against any exposure of the eye to cold, &c., and should she get an attack of pain in the eye to return to me immediately, when it might be necessary to perform an operation on it. This course I adopted for the following reasons:—the lens had been ten days in its abnormal position, and yet had caused no bad symptoms: the iris and anterior chamber seemed to tolerate its presence, and, as is known, it might remain transparent for a very long time, whereas by cutting it out, all the dangers of extractions were risked. I saw this patient again in three weeks time, and the lens was then in the same condition. Unfortunately I have never seen her since; it would be very interesting to know how long this lens would retain its transparency.

CLINICAL AND ANATOMICAL OBSERVATIONS.

By Mr. Hulke.

DISSECTIONS OF TWO EYE-BALLS, ONE AFFECTED WITH ACUTE AND THE OTHER WITH CHRONIC GLAUCOMA.

I.

Acute Glaucoma. — A transverse section through the short remaining portion of the optic nerve outside the sclerotic measured $1\frac{1}{4}'''$ in diameter, whilst the opening of the outer sheath was $2'''$; the bundles of nerve tubes were small and opaque. The optic nerve-entrance was deeply cupped; the lamina cribrosa was pushed outwards, and the excavation had laterally undermined the sclero-choroidal foramen (Fig. 1, Plate XII.) The hollow was lined by an opaque fibro-granular layer $\frac{1}{172}''$ thick, remains of the wasted nerve. At $1'''$ from the optic nerve-entrance all the retinal elements were present in their regular order, but the opticus fibres formed a much thinner stratum than natural, and few ganglion cells were seen. The intergranular layer was unusually thick: the other elements presented no noteworthy appearances.

In front of the equator, the choroidal epithelium was macroscopic, and crowded with pigment; and its regularity was much disturbed by colloid thickening of the subjacent elastic lamina. The colloid globes were numerous, and many were very large. Behind the equator the choroidal epithelium was more regular as regards the size and shape of its cells, and their pigmentation. The choroidal capillaries were filled with blood and much enlarged, having an average diameter of $\frac{1}{800}''$, (Fig. 2) whilst the average of several measurements of the corresponding vessels of a healthy choroid was $\frac{1}{1499}''$. The vessels of the ciliary body and iris were also dilated, and distended with blood discs; but I failed to detect any alteration in the muscular elements of these organs. The pupil was dilated. The lens was cataractous. The anterior chamber was small.

II.

Chronic Glaucoma.—The optic nerve just outside the sclerotic was $1\frac{1}{2}'''$ in diameter; its nerve-bundles were wasted. The walls of the central artery in the trunk of the nerve were

hypertrophied, its calibre was not dilated, but that of the vessels running in the septa between the bundles of nerve tubes was greatly so. The optic nerve-entrance was deeply hollowed, and the lamina cribrosa thrust outwards, though to a less extent than in the preceding case; the sclero-choroidal foramen was also laterally undermined (Fig. 3). The walls of the retinal arteries were hypertrophied. Small capillary hæmorrhages had occurred sparingly amongst the opticus fibres, the latter had a granular appearance and formed a thin opaque stratum. Immediately around the optic nerve-entrance the cells of the two granular layers were less closely packed. These were the only morbid changes found in the retina. The epithelium, elastic lamina, and stroma of the choroid, and the contractile elements of the iris and ciliary muscle, had not undergone any apparent change; but the vascular system of the entire tunica uvea was dilated and gorged with blood discs. The anterior chamber contained an albuminous coagulum. The lens was cataractous.

When I received these eyes for dissection, they had been cut in halves at the equator and had lain several months in a solution of chromic acid. They had been enucleated during life, and I was told that one was an example of acute, the other of chronic glaucoma; and that, in both, the vitreous humour was transparent and firmer than natural. As well as I could judge the shape and dimensions of these eyes were normal.

III.

Slow Failure of Sight, Complete Blindness Two Years. Acute Glaucomatous Inflammation. Deep Excavation of the Optic Nerve-Entrance.

Thomas R. was admitted into the Royal London Ophthalmic Hospital, June 14th, 1860, with acute glaucomatous inflammation of the left eye of 18 days' duration. Its sight had been quite lost two years, having began to fail nine years before. His right eye had inter-current obscurations, and a large, brownish scotoma, its field of vision was not otherwise contracted, its tension was normal. The iris was prominent, and the anterior chamber small. The pupil, of medium size, was inactive. The optic nerve-entrance was greyish and very slightly excavated.

As his left eye was quite spoiled and gave him extreme suffering Mr. Bowman excised it.

Dissection—

Its shape and dimensions were natural. The vitreous humour was clear and of a natural consistence. The optic nerve-entrance was excavated, but less deeply than in the two preceding cases (Fig. 4, Plate XII). The bottom of the excavation, outside the level of the choroidal foramen, was flat; it was formed by the lamina cribrosa covered by a thin opaque granular and fibrous layer, remains of the wasted nerve. The opticus fibres where they wind round the margin of the choroidal foramen, to pass over into the retina, formed a dark band only $\frac{1}{143}''$ thick; whilst at the distance of $1''$ from the foramen they, together with the other retinal elements, were transparent and had a combined thickness of $\frac{1}{70}''$.

The vessels followed the surface of the hollow, and mounted upon its sides; within the area of the nerve-entrance they were collapsed, whilst in the retina they were distended. I nowhere saw any traces of fatty or earthy degeneration, but the arterial walls were hypertrophied, their thickness being great in proportion to the calibre of the vessel. Here and there was a sacculated capillary, and a few small dots of hæmorrhage were sprinkled over the inner surface of the retina. The extravasated blood was wholly confined to the inner layers. Vertical sections of the retina, at various points between the porus opticus and ora serrata, were transparent; the rods and bulbs, and the granular layers seemed to be healthy; whilst the combined thickness of the inner layers (the opticus fibre, ganglionic, and grey nervous) was much diminished. The bundles of tubules in the trunk of the optic nerve, outside the lamina cribrosa in the sclerotic canal, were small and opaque, and the diameter of the nerve was less than natural. The vessels of the choroid, the ciliary body, and the iris, were distended. I did not detect any abnormal change in the muscular elements of the two last-mentioned organs. The choroidal epithelium was almost perfect, except at a few scattered irregular spots near the ora serrata, where the white inner surface of the sclerotic was visible. At these spots the epithelium was absent, and the cells immediately around them were withered and ragged, whilst others at a short distance presented great differences in size, and in the quantity of pigment they held, some cells being crammed, whilst others were almost empty. There were a few macroscopic cells of colossal size, some of them measuring $\frac{1}{320}''$.

IV.

Acute Glaucoma of the Right Eye. Iridectomy, followed by Cataract. Linear Extraction. Chronic Glaucoma of the Left Eye. Cerebral Disease.

David P., age 48, a pale, feeble artisan, of rheumatic habit, was admitted into the Royal London Ophthalmic Hospital, August 30th, 1859. Three and a-half years previously his right eye had been attacked by acute glaucoma. Three weeks after this, there was a slight remission, and for some time longer he retained a feeble perception of large objects. He then began to be troubled by photopsia, which was accompanied by a progressive contraction of the visual field of the left eye, the right eye being quite blind. When he came under my care, the right eyeball was a typical example of glaucoma in its last stage; it was very hard, and extremely painful. The subconjunctival veins were very varicose; the pupil was widely dilated. An opaque very green lens prevented an ophthalmoscopic examination of the fundus. Vision was quite extinct.

The left eye had been recently subjected to iridectomy in another hospital; only a very small segment of iris had been excised, and the gap was filled by a tawny mass, a decolorized blood-clot, or lymph, which covered the iris for a short space beyond the edges of the artificial coloboma, and also filled up the angle at the margin of the anterior chamber. The half-dilated pupil was adherent to the capsule. The lens was swollen and milky. The subconjunctival veins were large and tortuous. Feeble quantitative perception of light remained. He was greatly distressed by photopsia in both eyes, suffered much from headache, and was very irritable.

Remarks—

From its swollen, milky, flocculent appearance, I thought it probable that the lens of the left eye had been injured when the iridectomy was done. The cataract, however, by itself, was quite insufficient to account for the extreme feebleness of the quantitative perception of light, and this made me suspect atrophy and excavation of the optic nerve-entrance, perhaps complicated with cerebral disease, to which the intense headaches and irritability pointed. This probable complication greatly diminished the already very slender prospects of any operation, but as removal of the opaque lens was his only chance, I determined to remove it by linear extraction, after enucleating the right eye which continued hard and painful, and was a constant source of distress,

and was possibly injuriously influencing the left. Three days after the enucleation of the right eye, I extracted the lens of the left, which I found diffluent, through a small opening at the lower and nasal side of the cornea. After this he was just able to recognize my hand and other large objects at a short distance, but the photopsia became more distressing than before the operation. He was now made an out-patient, and never returned, but I subsequently heard that he was dying with brain symptoms. I regret that I was unable to visit him, or procure a post mortem examination.

Dissection of the right eyeball.—

Two hours after the enucleation, the globe was still tense. Its transverse diameter was much increased by bluish staphylomata behind the insertions of the tendons of the M. Recti, the largest being beneath the M. R. Int. The sclerotic, choroid, and retina preserved their natural relations. The vessels of the choroid, ciliary body and iris were gorged with blood; their other component tissues were healthy. The retina was sprinkled with spots of capillary hæmorrhage; traces of the rods and bulbs of the outer globular layers were nearly everywhere visible, but the inner granular layer, the ganglion cells and nerve fibres, were absent in front of the equator, and much wasted in the posterior half of the fundus. The optic nerve-entrance was deeply cupped (Fig 5). The hyaloid capsule of the vitreous humour, in its whole extent, was separated from the membrana limitans of the retina by a thin stratum of yellow serum. The vitreous humour itself had an orange stain, and near the back of the lens it contained a partially decolorized blood-clot. A plug of tangled, adventitious, fibroid tissue, continuous with the vitreous humour, enveloped by the folded and wrinkled hyaloid capsule, and charged with small orange masses of hæmatine, occupied the hollow of the nerve-entrance. The cataractous lens had a yellow stain. In consequence of the extreme dilatation of the pupil the iris formed a very narrow ring, bordering the anterior chamber. The distance between the anterior pole of the lens and the opposite point of the posterior surface of the cornea was $\frac{3}{4}'''$.

Remarks—

The detachment of the hyaloid capsule from the membrana limitans, and its displacement inwards towards the axis of the axis of the globe by stratum of serum is worthy of note; for it conclusively proves the distinctness of these

two membranes, which some have denied, and it explains the not very infrequent ophthalmoscopic appearance of a delicate, transparent, undulating, gauzy membrane, closely overhanging the retina. It may fairly be inferred from their turgescence, that the retinal capillaries were the source of the effused serum, in which case the detachment of the hyaloid capsule has its analogue in the displacement of the retina by serous excavation from the choriocapillaris. It is also interesting to notice that the typically glaucomatously green colour which the lens had in the living eye became a pale orange in transmitted light after its removal from the eyeball. I believe the coloration of the lens was produced by endosmose of dissolved hæmatine from the partially decolorized blood-clot in the front of the vitreous humour.*

The appearances depicted in Figs. 1, 3, 5, closely resemble those described by H. Müller in some dissections published in the A. f. O., and they confirm his inferences, because they clearly prove that the excavation of the optic nerve-entrance must have been effected by pressure from within, since no traction from without, or behind, could cause a lateral extension of the hollow so as to undermine the inner edge of the sclero-choroidal foramen. It is this overhanging edge where the cup is deep, which conceals the veins and gives the characteristic appearance of a complete break in their course. It is the pressure also which causes the varicosity, sacculation, and rupture of the retinal capillaries, and turgescence of the veins, by hindering (and during the arterial diastola completely preventing) the exit of their blood from the globe, partly by nipping the veins against the edge of the sclero-choroidal ring, and perhaps also by a tightening of the meshes of the lamina cribrosa. The increased muscularity of the retinal arteries, which I described in 1857* is due to the increased resistance produced by this venous obstruction. It is particularly worthy of note that notwithstanding the great dilatation and distension of the choroidal capillaries, no ruptures were detected. The accumulated results of a large number of dissections lead me to believe that choroidal capillary hæmorrhage is uncommon, and I have been assured by our Curator, Dr. Bader, that this coincides with his experience.† The

* Contribution to the Morbid Anatomy and Pathology of Glaucoma. Med. Chir. Trans. vol. xli. 1858.

† Hæmorrhage from the veins into the stroma or between the choroid and sclerotic is not very unfrequent. I recorded a case of this kind where it

reason of this immunity from rupture cannot be explained by supposing a low tension of their walls, in consequence of the ready escape of the blood from the afferent veins through their sclerotic foramina; because the gorged and dilated state of the veins and capillaries shows that a very high tension is present. May not the closeness of the capillary net partly account for it, because the meshes are so small that when the vessels are much dilated these interspaces become almost obliterated, and the opposite walls of adjacent vessels mutually support each other and equalize the strain, whilst the elastic lamina affords a uniform support in front. The case is quite different in the retina where the spaces between the capillaries are comparatively very wide.

In these as well as in several other dissections, of glaucomatous eyes, I found no effusion of serum between the choroid and retina. I call attention to this because, in this country, a serous effusion of this kind is still thought to be an early and essential feature of the glaucomatous process.

V.

Posterior Staphyloma. Acute Inflammation of the Choroid and Retina.

Mary P., æt. 40, a thin, weak, highly nervous woman, first came under my notice at the Royal London Ophthalmic Hospital, October, 1857. At that time her right eye was myopic and amblyopic; she could only recognize large objects with it, and this indistinctly; a concave lens gave positive, though but slight improvement. An elongation of its antero-posterior axis was observed when the eye was strongly converged; this was due to a slight conicity of the cornea, the apex of which was nebulous, to an extension of the ciliary region, and to a posterior staphyloma at the outer side of the optic nerve-entrance. The subconjunctival veins were varicose. The globe was slightly tense. The lens had been extracted seventeen years previously. The right eye was also myopic, and had a similar but smaller staphyloma at the outer side of the optic nerve-entrance.

I next saw her in the spring of 1859, when the left eye was very congested, hard, and painful, and its sight was quite extinct. As it was quite spoiled, and her right eye seemed to be distressed by it, I advised enucleation, which she declined. She returned to the Hospital April 17th, 1860,

immediately followed extraction, the preparation is in the Museum of the Royal College of Surgeons; and our own museum contains four similar preparations of glaucomatous eyes.

with intense congestion and great hardness of the left eyeball, chemosis of the conjunctiva bulbi, a deep ragged ulcer of the cornea, and the large anterior chamber distended with turbid serum. The pupil was obstructed. She suffered great pain in and around the eye.

Her right eye soon tired, and became painful, and it had muscæ. The greatest breadth of the posterior staphyloma equalled half the diameter of the optic nerve-entrance. The retinal vessels were small. The vitreous humour was hazy, and contained floating gauzy membranes. A -6″ lens enabled her to read large type, and to recognize distant objects.

Her left eye gave her so much distress, that she now came to beg me to remove it, which I did by enucleation in our customary manner.

Dissection—

Its antero-posterior axis measured $14\frac{3}{4}''$, its greatest transverse measurement was $9\frac{1}{2}'''$. This great elongation of the globe was mainly due to a staphylomatous extension of the posterior half, which reached backwards $1\frac{1}{2}'''$ behind the insertion of the optic nerve, which was at the inner side of the staphyloma. The condition of the cornea has been already noticed. The sclerotic, anteriorly, had a natural thickness, but at the posterior staphyloma it was three times thicker than at the corresponding point on the opposite inner side of the optic nerve (Fig. vi, 6). This extreme thickening was due to an excessive vascularity chiefly of its outer layers, to an unravelling and separation of its fibres by a copious effusion of serum, and by large nests of exudation corpuscles. The iris was tough and much thickened by parenchymatous exudation, its anterior surface was coated by a tough false membrane which stretched across and perfectly closed the pupil. The ciliary body was also infiltrated with exudation corpuscles and serum, and greatly thickened. The longitudinal, and oblique bundles of the ciliary muscle were distinctly traceable; they had a granular dark appearance, and their nuclei were few and indistinct. The choroid everywhere preserved its relations with the sclerotic and retina; its stroma was distended with exudation corpuscles and serum; the stellate pigment cells were scattered, and in parts wholly absent; the elastic lamina was unchanged, and everywhere continuous, the hexagonal epithelium was unbroken, but the cells were swollen and ragged. These changes in the choroid reached their maximum at the posterior

staphyloma and gradually decreased towards the ora serrata. The retina was opaque, and at the centre of the posterior staphyloma had a maximum thickness of $1\frac{1}{2}'''$ (Fig. vi, 7.), becoming gradually attenuated towards the optic nerve-entrance, and towards the ora serrata. The radiating fibres, enormously stretched, and widely separated, formed the most conspicuous object in the field of the microscope. Some of them were transparent, had bright, sharp, even outlines, whilst others were swollen and opaque, had softer outlines, and were varicosely enlarged. The elements of the inner and outer granular layers were withered and scattered, the ganglion cells were also atrophied. The opticus fibres were granular and dark, but they had no double outline and were not thickened. Only a few traces of the rods and bulbs were visible. The vessels were atrophied. The whole retina was charged with exudation corpuscles and much granular molecular matter, yet its stratification was nowhere wholly lost. At one point of the staphyloma the retina and sclerotic appeared to the unaided eye to be directly continuous through a breach in the choroid (Fig. vi, 8.); the three tunics were here very firmly adherent, and the hexagonal epithelium of the choroid was absent, but the elastic lamina was continuous.

The optic nerve was atrophied. Its inner side deeply excavated and undermined, was over-hung by the projecting margin of the sclero-choroidal foramen; its outer side gently sloped into the staphyloma. The bottom of the cup was formed by the lamina cribrosa, and festooned by the attachment of folds of hyaloid membrane which converged towards it. The hyaloid capsule was partially separated from the membrana limitans by a thin stratum of exudation. The vitreous humour formed a solid milky mass, friable at the centre but tougher externally.

It, too, was infiltrated with exudation corpuscles, and traversed by a tangled web of intricately interlacing fibres resembling those found in coagulated fibrine (Fig. vii); the corpuscular elements were most plentiful centrally, and the fibrous abounded externally in the tougher portions. The corpuscles were formed endogenously in large brood cells (Fig. vii), some of which contained as many as four, five and six of them, these brood-cells were certainly connected with hyaloid membrane, and were, I believe, metamorphoses of its persistent nuclei. The shrunken remains of the torn capsule of the lens were glued in a compressed mass to the back of the

iris. The ciliary processes were coated by a tough laminated deposit, moulded in the canal of Petit.

VI.

Ciliary and Posterior Staphyloma of the Left Eye. Enucleation and Dissection. Posterior Staphyloma of the Right Eye. Myopia and Amblyopia.

Mary Ann W., a pale, delicate girl, æt. 19, deeply scarred by small-pox, was admitted into the Royal London Ophthalmic Hospital, September 20th, 1859. Her left eye, which for several years had been quite blind, was much enlarged, and her personal appearance was so greatly disfigured by it, that she was unable to obtain employment. The ciliary sclerotic was elongated, thinned, bluish, and studded with a circle of small oval projections. The pupil, very small, irregular, and completely obstructed by a greyish membrane, was drawn towards the lower and inner part of the cornea, where there was an adhesion of the iris. At this point the cornea was opaque, and its surface was uneven. A chalky-white shrunken lens was visible through the partially closed pupil. I attributed the total blindness to wasting and excavation of the optic nerve-entrance. Her right eye was myopic, and slightly amblyopic. With a -3″ lens she was just able to read No. 8, and to recognize, though imperfectly, large objects a few feet from her. The outer side of the optic nerve-entrance was clipped by a white crescentic figure, indicating a posterior staphyloma.

Remarks—

As she was anxious to get rid of the disfigurement, and to wear an artificial eye, I enucleated the left eyeball, preferring this course to abscision of its front only, because its general enlargement, and the obvious signs of former sclero-ciliary and iritic inflammation, coupled with the presence of posterior staphyloma in the other eye, made me suspect the presence of a posterior staphyloma (which the obstruction of the pupil prevented me from verifying with the ophthalmoscope), as well as a fluid state of the vitreous humour; and I had seen on more than one occasion troublesome bleeding follow excision, where the posterior half of the globe was unsound. The conjunctival wound was drawn together with a fine silk stitch; it soon healed, and she left the hospital in a few days with an artificial eye.

Dissection—

The antero-posterior diameter of the enucleated eyeball

was 15‴, and its transverse at the equator measured 12‴. At the outer side of the optic nerve there was a small hemispherical staphyloma nearly 2″ in diameter, which projected $1\frac{1}{2}$‴ beyond the general curve of the globe. The vitreous humour was diffluent, but transparent. At the outer side of the optic nerve-entrance was a white crescentic figure which exactly corresponded to the staphyloma. Here the sclerotic was thinned, and the meshes of its fibrous tissue were loaded with oil globules. At this spot the choroid and retina adhered so firmly to each other, that I could only imperfectly separate them; the choroidal epithelium was absent; the multipolar cells of the stroma were few, and held but little pigment; the chorio-capillaris was atrophied. A thin layer of opaque nerve fibres passed from the optic nerve-entrance outwards across the white crescent; the other retinal elements had disappeared, leaving in their place an opaque fibro-granular detritus.

The optic nerve-entrance had an elliptical outline; its long axis was vertical; and the side bounding the staphyloma was abruptly excavated down to the level of the lamina cribrosa (Fig. viii.) At the equator there were a few small white patches, where the absence of the choroidal epithelium, and the withering of its stroma, exposed the inner surface of the sclerotic to view; the retina had here undergone the same changes as at the posterior staphyloma. Elsewhere the retina and choroid were naturally adherent; the minute structure of the latter presented no obvious alteration, but the stratum of opticus fibres and ganglion cells was everywhere thin and opaque.

The ciliary processes were scattered, elongated, and interrupted. The lens was a flattened, chalky disc; its anterior capsule dotted with colloid globes, and coated externally with a tough, adventitious, fibrous membrane, was puckered, forming a central button at the anterior pole, which projected into the partially closed pupil. The hyaloid septum forming the posterior wall of the canal of Petit had been stripped from the ciliary body as far backwards as the ora serrata, and the lens unsupported behind swung to and fro. The iris generally was thin, its muscular tissue was atrophied, but the uvea was loaded with its usual pigment. Where it was tied to the cornea, the iris had a thickness of $\frac{3}{4}$‴; the connection was very firm; it required some force to tear it through, and shreds of iris remained on the cornea. The great thickness of the iris at this spot was

caused by a dense adventitious web of large multipolar cells which converged towards the cornea. The body of these cells contained a nucleus imbedded in pigment, with which the fibres also were loaded. The posterior elastic lamina seemed to pass unbroken across the synechia, up to which point the epithelium was also perfect; it was covered by a film of coagulated albumen. Corresponding to the synechia the corneal tissue was the seat of an active cell-growth.

Remarks—

The changes which the optic nerve-entrance undergoes in advanced posterior staphyloma are well shown in these two cases (V and VI). The occurrence of excavation has been described by v. Graefe. In case VI it was confined to the half of the nerve-entrance bordering on the staphyloma (Fig. viii, 1), and the partial character of the excavation, and the non-displacement of the lamina cribrosa outwards accord with the observed absence of hardness of the eyeball during life. Case V illustrates an occasional termination of staphyloma posterior, which is generally seen in old persons —the occurrence of acute inflammation. In this instance, where excessive intraocular pressure was so prominent a symptom, the excavation of the nerve-entrance was very complete, and had undermined the edge of the sclero-choroidal foramen opposite the staphyloma (Fig. vi). The disappearance of the margin of the sclero-choroidal foramen corresponding to the staphyloma as the latter increases, until the hollowed nerve-entrance slopes uninterruptedly into the hollow of the staphyloma was also particularly marked. The extreme thickening of the tunics is worthy of note.

Selected Cases.

CASE XLI.—FIBRO-CALCAREOUS GROWTH FROM THE UPPER AND OUTER WALL OF THE LEFT ORBIT.

By Dr. Bader (*Curator*).

Richard R., aged 19, was admitted at the Royal London Ophthalmic Hospital under the care of Mr. Bowman, in July, 1860. He is a fair, tolerably healthy-looking man, with a large head and face and thin slender extremities; his teeth are irregularly arranged but without specific marks. He had been subject to severe headache from the age of 9—13.

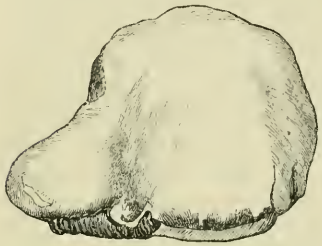
There is no history as to tumours in his family. His eyes soon felt fatigued when reading, etc. The patient had, five years ago, been growing rapidly; at the same time it was noticed "that the left eye had become larger" and a few months after that, the eyebrow and upper lid become very prominent. This prominence increased rapidly for the last 18 months. He never had any pain, double vision, or flashes of light, but the sight of the eye was impaired.

On admission it was found that a smooth, firm, hard, fixed tumour, a little larger than a walnut, projected from the outer and upper part of the left orbit, pushing forwards the skin of the upper lid of the eye and displacing the latter inwards and downwards, so that the lower margin of the right cornea stood level with the upper one of the left. The skin of the lid was moveable and not changed in colour, and he could close the eyelids over the tumour but they were stretched. The conjunctiva was slightly congested, but otherwise the eye appeared healthy. No change could be detected with the ophthalmoscope, except perhaps that the optic nerve of the eye affected was a little paler than that of the right one. He could read No. 16 of the "Test types" and could recognize distant objects.

On July 24th, Mr. Bowman proceeded to operate. The man being placed under the influence of chloroform, an incision was made through the upper lip, about two and a half inches long, and about three lines below the eyebrow. This exposed the anterior surface of the tumour, which appeared white and glistening. It was then freed from the soft parts so as to admit the use of the blunt chisel and the gouge. The former instrument could not, without difficulty, be introduced between the tumour and the outer and upper orbital edge. On continuing the efforts to pass the gouge deeper into the orbit, the bulk of the mass suddenly broke away from its attachments and was extracted. Several small portions were afterwards removed by the gouge from the wall of the orbit. Part of the upper and outer wall, as far as the apex of the orbit felt rough, there was scarcely any bleeding. The lips of the wound were brought together by sutures, and slight pressure was applied. None of the contents of the orbit appeared to be injured by the tumour, only displaced.

He had no pain or any bad symptom after the operation. The outer angle of the wound had not quite healed when the patient left. The skin surrounding this portion was reddened, swollen, and tender. A few drops of a yellowish

clear fluid escaped on pressure. The movements of the eye were free, there was no double vision, the lid was opened with difficulty. The patient recognized distant objects and read No. 4 of the "Test types." The eye had considerably receded, but stood still a little lower than the right eye. The following particulars I received on September 28th, 1860, from the patient, "the part cut is healing very satisfactorily, but not completely finished yet. The eye is also going gradually back to its place, but it protrudes a little yet, which I think will diminish when the swelling is entirely gone, which is not the case yet. I can see nearly as well with it as with the other eye, and I have begun to do without the shade over it," etc.



Preserved in the R. L. O. H. Museum.

The annexed woodcut shows the size and somewhat the form of the mass. The broad end was towards the front, protruding the upper lid, and the narrow end towards the apex of the orbit. It is sketched resting on the surface, by which, on its whole length, it was attached to the outer and upper walls of the orbit.

The free surface of the growth (the one which projected into the orbit) was smooth, glistening white, resembling articular cartilage in colour. The surface was slightly moveable upon the deeper parts, as a thick layer of periosteum would be upon bone. A section of the growth was made with a scalpel. It was covered by a very thin layer of fibrous tissue; the slight movement of the surface was due, to the young superficial parts. The proportions of thickness of (*a*), the covering fibrous tissue; of (*b*) the young superficial growth, and of (*c*) the deeper porous growth (Plate XII); were for *a* $\frac{4\,5}{1\,3\,0\,0}$ of an inch, *b* $\frac{1}{4}$ of a line, and *c* 1 inch.

The weight of the growth was 6 drachms. *a* and *b* had a reddish-white opaque, and *c* a porous dark-red appearance; the pores were largest where it had been attached to the orbit. The growth was slightly compressible; blood escaped from the pores on pressure. It appeared to the naked eye and to the touch to be composed of porous bony tissue.

The surface of the growth consisted of a thin layer of fibrous tissue; some parts of which were covered with round cells. Few blood-vessels were seen ramifying among this tissue.

From the inner aspect (the one nearest the growth) of most of the fibres, were seen other fibres descending into the growth; enlarging at different intervals, and forming dilatations. The dilatations nearest the surface of the growth were arranged in parallel rows, which, when the fibrous tissue was seen with a low magnifying power, gave it the appearance of beaded parallel fibres thickly sprinkled with granules. (See Plate XII, Figs. *a* and *a'*.)

The outer surfaces of these dilatations were connected with each other by short filaments of fibrous tissue, which were the shortest next the surface of the growth: in the deeper parts they were also inserted into the walls of blood-vessels. (Fig. *d, d, f, g.*)

At a quarter of a line from the surface of the growth, the dilatations became larger and formed numerous anastomoses with each other. (Fig. *m, p, f, g.*)

These anastomoses assumed, in the deeper parts of the growth, the size of the dilatations, forming a network of grey opaque, irregularly dilated spaces, (*f.* in Fig. *d, d, f, g.*) the interspaces of which were occupied by fibrous tissue (*g.*) which latter was perforated by numerous large blood-vessels (veins). (*d, d.*) The blood-vessels were kept open by the fibrous tissue.

A yellowish transparent elastic and gelatinous substance and slightly opaque granules were seen in the dilatations nearest the fibrous covering of the growth. The contents of the dilatations disappeared on addition of pure hydrochloric acid; no air was developed, the fibrous tissue became indistinct. An abundance of air-bubbles escaped on addition of pure hydrochloric acid from those deep-seated dilatations which were filled with the grey opaque substance. Microscopic sections taken from the latter part of the growth, and which appeared almost transparent to the naked eye, became whitish and opaque on addition of the acid, on account of the quantity of air developed. The dilatations after addition of the acid, retained their shape and became almost transparent like the surrounding fibrous tissue; both disappeared entirely after a longer contact with the acid.

The superficial dilatations appeared highly elastic, assuming different shapes on pressure. The minute slightly opaque granules seen in those dilatations were attached to their walls; they probably were points of calcification.

The fibres of the tissue, which connected the dilatations were straight, and radiated from the vessels towards the dilatations.

The vessels were large, gaping, and passed through the growth in a direction parallel to the walls of the orbit, to which it had been attached.

Case XLII.—Scars of the Choroid after Traumatic Rupture.

By Dr. P. Frank (*Army Medical Staff*).

In the second part of the first volume of Græfe's "Archives," Dr. v. Ammon relates the case of a soldier who had committed suicide by discharging a musket loaded with powder and water into his mouth, the muzzle being directed towards the hard palate; the skull was extensively fractured; the optic nerves were torn across at the base of the brain; but the eyeballs themselves had escaped from direct injury. On examination, however, the severe concussion sustained was evident by the existence of serious intraocular lesions. In one eye, the description of which more particularly interests us on the present occasion, the iris was dislocated into the posterior chamber with partial retroversion of the lens and vitreous humour; there was a very slight effusion of blood between choroid and sclerotic, and in one part a wedge-shaped rupture in the choroid was observed without any corresponding solution of continuity in the retina or sclerotic tunic.

This is, as far as I am aware, the only case on record, where dissection has revealed the existence of isolated choroidal ruptures, as a result of concussion of the eyeball. Previous to this however, A. v. Græfe had described (in the first number of the Archives) two cases, where ophthalmoscopic examination demonstrated a similar lesion. In one case, after an injury leading to fracture of the nasal bones, with contusion of the eyelids and impairment of vision, a rhombic portion of the back-ground around the nerve-entrance, with streaks of choroidal ecchymosis at its margins, was separated by a dark-brown line from the surrounding parts. The effused blood became gradually absorbed, but the dark-brown line gradually assumed the brilliant white colour due to scleral reflection. The retinal vessels could be distinctly traced across the choroidal cicatrix,

one branch only suffering an interruption in its course; so that the retina, if ruptured at all, had at all events sustained but very minute lesions.

In a second case, where convergent strabismus and amblyopia followed an injury, the nature of which is not defined, a bright streak of about half the breadth, and five times the length of the entrance-disc, extended towards the inner side across the background of the eye. The margins were freckled with rust-coloured pigment-granules, and the retinal vessels crossed its course without any interruption. The patient could read large print with difficulty.

I have had opportunities of observing two cases of a similar nature. In one, the eye had frequently sustained direct contusion, and different choroid changes coexisted with the bright silvery streaks, pointing to fissures in that membrane.

The second case is invested with peculiar interest. The choroidal rupture originated in an indirect injury, and the changes by which perfect blindness was finally induced, supervened at a period remote from the date of the primary accident.

The patient referred to—a private of the 68th regiment—was invalided from India for blindness of the right eye. Eleven years ago, he states that he received a blow from a brickbat over the right supraorbital region. The contused wound is said to have healed in a few days, and neither disturbance of vision nor pain in the eyeball was observed. Gradually, however, contraction of the external rectus supervened, and shortly afterwards marked divergent strabismus existed, without any diplopia having occurred during its development. It must hence appear highly probable, that notwithstanding the assertion of the patient to the contrary, some intraocular lesion had resulted from the injury alluded to, rendering it desirable for the right eye to be excluded from the act of vision in combination with the left, with which its less distinct impressions would have interfered. It is so well known, how often advanced monocular amblyopia, particularly if only an excentric portion of the visual field is affected, passes undiscovered, till some accidental circumstance reveals its presence, that the assertion of the patient to the contrary can weigh but lightly against assuming it to have existed in this case, as many obvious reasons must lead us to do. Three years after the injury the external rectus was divided to rectify the abnormal position of the eye. The

operation was to a certain extent successful. It was not followed by diplopia.

Whatever the condition of the eye may have been subsequent to the injury, it appears certain, that when the patient enlisted in April, 1858, central vision was moderately perfect, as he states to have been able to read the middle-sized print of his attestation paper when the left eye was closed; and to have been able to see the target at 900 yards distance at rifle drill. I need not say that a portion of the visual field may nevertheless have been quite insensible to both qualitative and quantitative perception of light. Nor were any abnormal sensations ever experienced in the eyeball till December 1853, when being in or near the tropics in the passage to India, he began to feel a "jumping" pain in the organ, which increased in intensity after exertion, and a month afterwards, on occasion of the left eye being closed by entrance of a foreign body into the conjunctival sac, vision of the right eye was found to be nearly quite extinct.

On admission into the General Hospital at Fort Pitt, the condition of the eyes was as follows:

The *right* eye is nearly quite blind; only when looking at the sun slight quantitative perception of light is stated to exist.

The right eye is diverted upwards and a little outwards in a position corresponding to contraction of the inferior oblique, and insufficiency of the external rectus, which, as is stated, was divided some years ago to remedy the strabismus, is easily recognized by examination of the muscular functions.

The pupil is contracted to the same extent as that of the left eye, but assumes medium dilatation when the latter is closed.

It dilates freely and rapidly with atropine.

The eyeball is not tense; on the contrary, it is of rather softer consistence than the left.

On ophthalmoscopic examination, in describing the result of which I shall refer for convenience sake to the inverted image, although the upright image has been carefully studied to verify details, the oval-shaped nerve-entrance appears whiter and flatter than natural, but shows here and there a very fine capillary dotting; the so-called scleral limit is not distinguishable. A broad crescent of jet-black pigment-granules skirts the lower and outer half of the margin of the papilla, the other portions of which are slightly diffuse in their outlines. The arteries are small, have a contracted,

empty appearance; the veins of very moderate calibre; the branch passing downwards and outwards is slightly tortuous in its course. A slight retinal haze veils these vessels, particularly in the upper part of the field in the posterior polar region. A few minute white streaks lead from the upper and outer margin of the optic disc to a grey heart-shaped patch about one-quarter its area, which seems due to retinal changes (exudation or fatty degeneration). The macula lutea, which is surrounded by diffusely infiltrated retina, appears as a round grey disc, surrounded by a sharply defined broad ring of most delicate but dense capillary vascularity. This ring is rather broader in the lower than in the upper half. It has evidently been the seat of exudative processes, with serious parenchymatous changes in the structural elements of the retina. Choroid elements are not distinguishable through the retina in this part of the fundus.

Forming an angle of about 80° with each other, two white bands arise respectively from the lower and outer, and lower and inner margin of the nerve-entrance. They are situated in the plane of the choroid, beneath the expanse of the retina, by the vessels of which they are crossed, and the bright, silvery light reflected from them leaves no doubt of the deficiency of the choroid elements along their course.

The *lower and outer band* which starts from beneath the pigment-crescent, lining the optic disc at this part, has at its commencement a breadth of about half the long diameter of the papilla. It is at first of a greyish colour, and is mottled and streaked with dark red-brown pigment, and bordered at its lower margin with a dark pigmented band, beneath which follows a pale, slightly freckled zone, intervening between it and the lower part of the choroid, where through a hazy retina the epithelial layer is seen to exist in perfect integrity.

After descending downwards and slightly outwards, the character of the band alters; it becomes gradually narrower, loses its freckled character, and after a slightly angular curve, it sweeps directly outwards, following the concavity of the background, as a *most sharply* defined streak about one-third its original breadth, from which the bright silvery lustre of the sclerotic is reflected with unusual brilliancy. Still further outwards it again widens, becomes again slightly freckled, but soon narrows after this fusiform dilatation, and proceeds as before as far as the eye can reach towards the ora serrata, distinctly bounded again below by a pigment-streak, and surrounded by disseminate choroiditic changes,

consisting in abnormal grouping of the pigment, punctated exudation, and groups of diffuse atrophic patches.

The retinal vessels cross it at various parts of its course, and over the last fusiform dilatation, one runs parallel with the margins of the band down its centre, leaving no doubt as to the retina having maintained its integrity above the solution of choroidal continuity.

From the lower and inner margin of the nerve-entrance, a choroid scar, (as I may now be allowed to style these bands) of the same character as that described, takes its origin, and sweeps downwards and inwards across the background. Rather narrower at its origin than the former, and more sharply defined from the commencement, its outer and lower border is also skirted by pigment, which is separated from the normal choroid for about twice the length of the diameter of the entrance by a pale, minutely freckled zone. The band then runs on its course with limits, sharp as limits can be, reflecting a brilliant metallic light, surrounded towards the periphery by a perfect spray of choroid alterations.

Above, the peculiar image, due to maceration of the intervascular pigment, is exquisitely marked; the intervascular spaces being of a bright yellow color; the vessels themselves distinctly visible; the epithelial layer being absent, and the contents of its cells massed together in patches and streaks. Here and there a few golden-yellow bead-like spots are sprinkled over the part, due most likely to exudation or altered groups of epithelial cells. Two arteries and a vein cross this lucent band close to its origin without suffering the slightest interruption in their transit, pointing again to the retina having sustained no solution of continuity in this part.

There can, in my opinion, be no doubt that these bands, of which I have attempted to give a detailed description, represent cicatrices after isolated rupture of the choroid membrane, and as a lesion of this kind can hardly be ascribed to any other than a traumatic cause, I feel no hesitation in ascribing them to the injury alluded to in the history of the case. Whether the eye itself was struck on the occasion, or the concussion of the supraorbital region was communicated with sufficient intensity to the eyeball, must, from the absence of accurate data be left undefined. The fact of the choroidal fissures occurring in the upper segment of the globe would admit of either of these explanations.

The diffuse retina-choroiditic changes, among which the

affection of the macula lutea is the most interesting and most important, may have supervened in that organ, predisposed by the results of the former lesion, under exciting influences, which I must also leave undefined, but among which the glare of a bright tropical sun at sea may be presumed to have played no unimportant part.

There was during the patient's sojourn in hospital no pain on pressure in any part of the eye, and the ophthalmoscopic image remained unchanged in the most minute details during the period.

Periodic nocturnal paroxysms of pain were, however, complained of. Quinine, local depletion, etc., seemed neither to diminish their severity nor to prevent their recurrence. Prolonged ophthalmoscopic examination never had the slightest influence in producing these attacks.

It would appear that the left eye was not uninfluenced by the more deeply affected organ. It reads—N.I. Jæger, with convex, 6, from $3\frac{1}{2}$–6 Engl. inches; is therefore slightly presbyopic. Without glasses from $5\frac{1}{2}$ to 9 inches only, and is therefore in addition slightly amblyopic.

The visual field shows considerable concentric contraction.

The ophthalmoscope shows the true nerve-section white, but the zone intervening between it and the choroid limit very pink from fine capillary injection; rather dilated veins, and slight retinal thickening in the posterior pole. In the periphery the choroid epithelium is found to be normal, and distinctly visible through the perfectly transparent retina.

Under the circumstances, I imagine that excision of the right eye would have been the most desirable proceeding; the patient, however, who was declared unfit for service on account of the loss of the right eye, was not willing to submit to this operation.

Case XLIII.—On a Peculiar Appearance of the Nerve-Entrance.

By Dr. P. Frank (*Army Medical Staff*).

In the left eye of a cavalry soldier who was invalided for hernia, and to whose eyes attention was directed on account of an affection of the lachrymal ducts, a light bluish-grey,

flask-shaped patch with a satin-like lustre was seen to cover the exit of the central retinal vessels which branched out from its margin in the usual manner across the normal background. This patch, which in one part was sufficiently transparent to permit two retinal vessels to be seen dimly through its substance, covered with its round body the greater part of the optic disc, with exception of a crescentic ring skirting three-fourths of its periphery, and sent a neck-like prolongation downwards and forwards, obscuring the lower fourth of the papilla, and extending about half the length of the diameter of the papilla beyond its inferior limit. The extremity of this cylindroid neck was rounded off and not very distinctly defined. The shape of this body was similar to that of a Cysticercus, but from the absence of all change in its outline, and of all signs of growth during the month it was under observation, the assumption of a parasitic origin must appear untenable. It is very probable that this image was due either to thickening of the hyaloid membrane or to a remnant of the fœtal hyaloid canal, to the occasional persistence of which in adult eyes attention was first directed by H. Müller.

I am, however, not aware that it has as yet been met with in the course of ophthalmoscopic investigation.

Vision was, as might be surmised, by no means affected in this case.

Original Papers.

ON THE

CAUSE OF APPARENT MOTIONS OF THE IMAGES OF OBJECTS SITUATED IN DIFFERENT PLANES WITHIN THE EYE, WHEN VIEWED BY MEANS OF THE OPHTHALMOSCOPE; WITH SPECIAL REFERENCE TO EXCAVATION OF THE OPTIC NERVE.

By Dr. George Rainy (*of Glasgow*).

(*Received December 19th.*—Ed.)

In an article which appeared in the number of this periodical for April, 1860, Mr. Streatfeild drew attention to certain apparent anomalies in the optical illusions observed during the examination of a case of cupped optic disk. An observer is not likely to be perplexed or misled by these in forming his estimate of the relative positions of the objects seen by him, when the case before him presents, in other respects, well marked characters of glaucomatous excavation of the optic nerve; because the latter are generally known and easily recognized; but he may happen to apply the principles usually followed in determining the relative positions of objects from the apparent motions of their images, in such a way as to fall into difficulty, in consequence of overlooking certain modifying circumstances. This is most likely to happen when the objects under examination are situated pretty far back in the vitreous body; but the case of cupped papilla optica affords as good an illustration of the subject as any other, and I shall therefore refer to it where illustration may seem to be specially desirable.

There are two kinds of apparent motions which fall to be considered in treating of this subject, viz., those depending on apparent changes in the relative positions of the images of bodies situated in different planes within the eye, and those depending on changes in the positions which the images seem to occupy with respect to the limits of the observer's field of vision. Apparent motions which may be referred to each of these classes may result from motions of the observer's head, from rotations of the eye under examination, or from motions of the biconvex lens held before it, if such a lens is employed.

In the case first mentioned, there is no real motion of the images themselves; in the latter two, the positions of the images are actually changed, but the apparent motions which accompany these changes are not always in the same direction with the real ones.

Let us first consider briefly the apparent motions from which the observer has to draw his conclusions, when he examines an eye without employing a collecting lens; and we may then proceed to examine the conditions under which a much more complicated set of phenomena present themselves when a lens is made use of.

I. *No lens employed.* — When the the observer is so situated as to see an erect virtual image of the objects in the eye under examination, and moves his head from side to side, the images of objects behind the pupil, the margin of which limits his field of vision, appear to move towards that side of the field towards which his head is moved; while, if the eye is rotated, these images move in the direction opposite to that towards which its cornea is directed; and, in both cases, the images of the objects seated furthest back have the greatest apparent motion.

The phenomena resemble those observed on looking at objects seated in different planes through a simple aperture, with this difference, however, that the image of each object, although magnified, is referred to a position behind it, and that the distances between the images are not exactly

proportioned to those between the objects, but increase in a mathematical ratio the further back the objects are—a circumstance which exaggerates the effect. Thus, when the eye under observation is rotated, the images appear to move in a manner similar to what would be observed in the case of the real objects if the eye were destitute of refracting media and enormously elongated posteriorly, with comparatively little change in the position of its centre of rotation.

In cases of extreme myopia, real inverted images of objects near the posterior pole of the eye are sometimes projected at so short a distance in front of the cornea, that an observer may see them without either using a lens or withdrawing himself to an inconvenient distance from the patient. In such cases, the images of the more deeply seated objects are at shorter distances from the pupil than those of the less deeply seated.

When the observer moves his head, these inverted images appear to move in the opposite direction, and those of the less deeply seated objects appear to move more than the others; while, if the eye under observation is rotated, the inverted images move, and appear to move in the observer's field of vision, in the same direction with the cornea,—the less deeply seated moving most.

II. *Lens employed.*

1. *Motions of the inverted image consequent on motions of the lens. Real motions.*—Let E (fig. 1) represent the eye under examination, which is supposed to be affected with excavation of the optic nerve; let A be a point at the centre of the bottom of the cup, (which is, of course, greatly exaggerated in its dimensions, and somewhat altered as to its position, for the sake of convenience and greater distinctness in the diagram;) let B and D be points situated on the retina, and at the upper and lower margin of the cup respectively, and let their distance from c— the optical centre

of the eye—be equal to that of its posterior principal focus from the same point.

Rays reflected from the point A, which is behind the posterior principal focus of the eye, and refracted at the various refracting surfaces in it, will converge, after they have left the cornea, towards a point such as A′ in the straight line AcA′, and they would cross one another at A′ and diverge again from thence, radiating within certain limits as they would from a point in a real illuminated object, provided nothing were interposed between E and A′.

Rays reflected from the points B and D will, after refraction, proceed parallel to the lines Bc and Dc respectively.

If we now suppose a biconvex lens to be placed a little in front of the eye, with its centre at L, the rays which came originally from A, and which are converging towards A′, will be made to converge still more by their refraction at the surfaces of the lens; and they will come to a focus in a—a point in the line LA′, at a distance from L somewhat less than the principal focal distance of the lens. Rays which came originally from B and D and which are proceeding parallel to the lines Bc and Dc respectively, will, after refraction at the lens, be caused to converge, and will be brought to foci in the points b and d in the straight lines Lb and Ld drawn parallel to the lines Bc and Dc respectively, and at distances from L equal to the principal focal distance of the lens.

Thus we have an image formed in the air, and the points a, b, and d correspond to the points A, B, and D in the object; so that the image must be regarded as an inverted one, except when its parts are considered in their relations taken antero-posteriorly. An observer placed at O will see this image, provided some of the rays which have crossed one another in each of the points a, b, and d enter his eye.

If the lens is now moved down till its centre is at 1, the focus of rays which are converging towards A′ will be at *a* in the straight line 1A′, and, as before, at a distance from 1

somewhat less than the principal focal distance of the lens. The points β and δ, which now correspond in the image to B and D in the object, are situated in the lines 1β and 1δ drawn parallel to the lines Bc and Dc respectively, and at distances from 1 equal to the principal focal distance of the lens.

The points a, β, and δ in the image now correspond to the points A, B, and D in the object; and it will be seen that while the whole image moves down when the lens is moved down, that part of it which represents A moves less than those which represent B and D, so that the image of D has approached that of A.

If we suppose the lens to be held with its centre at L_2, further from E than the principal focal distance of the lens, the points b_2 and d_2 in the inverted image will occupy positions with respect to the point L_2 similar to those occupied by b and d with respect to L; while the point a_2, which now corresponds to A, comes to be rather nearer to L_2 than a is to L.

If the lens were now moved down so as to have its centre in l_2—as far from L_2 as 1 is from L—the points β_2 and δ_2 corresponding to B and D, would come to occupy positions with regard to l_2 similar to those occupied by β and δ with regard to 1—they would move down as much as before—but the image of A, in moving from a_2 to a_2, which is a point in a straight line drawn from l_2 to A′, would not move down quite so much as it formerly did when its position was changed from a to a; although, from its greater proximity to the lens, the difference would be slight. If, however, the lens were as far forward as A′, the image of A would coincide with A′, and it would not change its position upon movements of the lens in a plane at right angles to the straight line AA′.

It will be observed that in both the cases represented in the diagram, the inverted image moves, as a whole, in the same direction with the lens, and that those parts of it which correspond to parts on the retina, move more than

these corresponding to parts in a plane posterior to it. If the lens were a little further from E than A′ is, the observer would see a virtual image of A′ between it and E; and if the lens were moved, this virtual image would move in the opposite direction. Such a case cannot well happen when the eye presents anything like a normal state of focal adjustment. For example, if the points B and D were in the plane of the posterior focus, and the point A $\frac{1}{25}$ of an inch behind it, A′ would be about a foot in front of the cornea. In a very extreme case of myopia, however, it may happen that images of objects in the retina itself are projected by the eye alone at distances of not more than two or three inches from the cornea. I have myself recently met with a case of staphyloma posticum, in which I could see such an inverted image distinctly without using a lens, when the distance between my eye and that of the patient was not more than ten inches, although my accommodative power is not unusually great. It is worth mentioning that this patient, although so myopic as to require a concave lens of two inches focal distance, or rather a combination equivalent to one of a somewhat shorter focus, in order to see objects held at a distance of ten inches from his eye with maximum distinctness, was not only able, with the aid of the lenses, to tell the letters of a moderately large type,—No. 12 of Jaeger's, I think,—he had never learned to read words, but saw well enough to work in a foundry without glasses; so that he seemed to be in a great measure free from the central amblyopia which usually accompanies the advanced stages of this disease.

Apparent Motions.—In both the cases represented in the diagram the image of A has a certain apparent motion upwards, with respect to those of B and D, when the lens is moved down, because it moves down less than they do. It approaches the image of D, and appears to move in a direction *opposite* to that in which the lens is moved, if parts at the margin of the cup are taken as objects for comparison.

Even if the point a maintained a position in relation to the points β and δ, similar to that held by a in relation to the points b and d, it would appear to an observer at O as if it were nearer to δ than a is to d, in virtue of the ordinary principles of perspective. This may be illustrated by holding a real cup, with its concavity towards the observer, and moving it downwards, when it will be seen that a point at the centre of the bottom of the cup will appear to approach the upper side of the rim, until at length it comes in line with it, and disappears behind it; and this effect will be exaggerated if the rim is caused to descend with greater rapidity than the bottom, as it does in the case of the inverted image.

Besides changes in the position of the image in space, it undergoes changes of relative position in the observer's field of vision when the lens is moved. The rays which have crossed one another at points in the inverted image, and by means of which it is rendered visible to the observer, do not radiate freely in all directions, as they would from points in a real object. They have all come through the pupil of the eye under observation, and the line of direction of each of them,—traced forward or backward, as the case may be,—passes through the real or virtual image of the pupil projected by the collecting lens. Hence, in order that a ray which comes from a given point in the inverted image of the fundus of the observed eye may enter the observer's eye, that point must be so situated that a straight line, drawn from the observer's pupil through it, passes through the image of the pupil of the observed eye; and this condition must be fulfilled, in order that such a point may lie within the observer's field of vision, which, accordingly, seems to him to be bounded by the pupillary margin of the patient's iris, as seen by him in the form of a real or inverted image.

If the lens is held, as at L, at a distance from the pupil of the observed eye, (or rather, from the erect image of its pupil, due to refraction at the cornea and situated a little anteriorly to the true pupil,) less than its own principal

focal distance, an erect virtual image of the pupil will be seen by the observer; and points at its upper and lower margin, will appear to the observer to be at p and q, which are situated in straight lines drawn through the centre of the lens and the points P and Q corresponding to them in the image already mentioned as seated in the anterior chamber; and the distance between p or q and the lens will depend on its distance from those points, increasing until it reaches infinity, when the lens is removed to its own focal distance from them.

When the centre of the lens is at L, the inverted image a b d appears to the observer to occupy the centre of his field of vision, which has the points p and q at its margin.

If the lens is moved down till its centre is at l, the image of the point P will ascend to the position π in a straight line drawn through l and the image P in the anterior chamber, and rather further from l than p is from L. In like manner, the image of Q will take the position χ in a straight line drawn through l and the image Q in the anterior chamber, and rather nearer l than q is to L. Thus the image of the pupil moves upwards, and its upper margin appears somewhat canted backwards when the lens is moved down.

If the lens were gradually removed from the observed eye, the image of its pupil would become more and more magnified, until, at length, the observer would cease to see its margin, and his field of vision for objects within the eye would be bounded by the margin of the lens itself. In this case, however, a very slight motion of the lens would suffice to bring the pupillary margin into view again; and the consideration of it need not detain us.

When the centre of the lens is at L_2, at such a distance from the observed eye that the image of its pupil, seen by the observer, is a real inverted one, projected between him and the lens, the apparent motions given to the image of the fundus oculi upon motions of the lens are quite different, although the real motions are similar. The point corresponding to P now comes to be at p_2, in a straight line

drawn through P and L_2, and that corresponding to Q is in q_2, in a straight line drawn through Q and L_2.

If the lens were moved down to l_2, the image of P would move down to π_2, and that of Q to χ_2; and the distance between π_2 and l_2 would be somewhat less than that between p_2 and L_2, while the distance between χ_2 and l_5 would be rather greater than that between q_2 and L_2. Thus, the inverted image of the pupil moves down, in this case, when the lens is moved down; and its upper margin appears as if canted forward.

Whether the centre of the lens is at L or at L_2, the image a b d, or a_2 b_2 d_2, appears to occupy the centre of the field of vision. When the lens is brought down from L to l, only those parts of the image which lie between the straight lines O π and O χ are visible to the observer at O; and it will be perceived that in this case, part of the image α β δ has sunk out of sight beyond the lower margin of the field of vision; so that both the real motion of the image and its apparent motion in the field of vision are in the same direction with that of the lens; and the images of B and D really move, and appear to move, faster than that of A. Again, only those parts of the image a_2 β_2 δ_2 which lie between O π_2 and O χ_2 are visible to the observer at O,* when the lens has been moved down to l_2, and the images of A, B and D, though they have really moved downwards, appear to move upwards in the field of vision; and the image of A, which has really moved less down than those of B and D, appears to move more upwards than they do.

Thus, in the former case, we have an apparent motion *towards* that side of the field of vision towards which the lens is moved; and, in the latter, a motion towards the *opposite* side; while, in the one case, the parts at the margin

* If the distance between O and the image a b d were the shortest compatible with distinct vision, the observer would require to retire to a distance from L_2 equal to the distance O L; but this will not affect the apparent motion in kind, though it may in degree.

of the cup appear to move most, and, in the other, those at the bottom of the cup.

On referring to Plate XI of the Ophthalmic Hospital Reports, illustrative of Mr. Streatfeild's article, and comparing it with the woodcut (page 243), which represents what is there termed the *false illusion*, it will be seen that in all cases, there is a displacement of the point at which the vessels emerge from the nerve at the bottom of the cup towards the side of its margin opposite to that towards which the lens is moved. Thus, in Plate XI, fig. D, where the lens is supposed to be moved down, the place at which the vessels enter the nerve at the bottom of the cup, and which corresponds to a or a_2 in the diagram, is nearer to the upper margin of the image of the cup, corresponding to δ or δ_2 in the diagram, than it is in the central figure in which these parts have relative positions nearly similar to those of a and d, or a_2 and d_2; and a similar displacement is represented at page 243. In both cases, too, the vessels are more exposed in the cup on the side towards which the lens is moved. Thus, in Plate XI, A, a greater portion of the vessel X is exposed on moving up the lens; while in fig. D, a greater portion of the vessel Z is exposed on moving the lens down.

As to the circumstance of the greater apparent motion of the vessels in the plane of the retina in the case of the false illusion, it may perhaps be explained by supposing the lens to be held at a distance from the eye under examination less than its own principal focal distance, and to be moved as from L to l; in which case they would have a greater apparent motion in the field of vision than those at the bottom of the cup, as well as a greater real motion—and that in the *same* direction with the lens; whereas, if the lens were held at L_2 and then moved to l_2, the vessels at the bottom of the cup would appear to move most rapidly towards the *opposite* side of the field of vision.

On this assumption, however, I should not expect to

find quite so great an apparent displacement of these vessels relatively to one another in the case of the false illusion as in the other, provided the same eye were under examination, and the same degree of motion were given to the lens.

2. *Apparent motions of the inverted image consequent on movements of the observer's head.*

If both the lens and the observed eye remain steady, while the observer moves his head down, the points a, b, and d will appear to move up in the field of vision bounded by p and q, so long as the centre of the lens is at L; and b and d will appear to move more than a. If the lens is held at L_2, the points a_2, b_2, and d_2 will appear to move down in the field of vision, limited by p_2 and q_2, when the observer moves his head down, and a_2 will appear to move more than b_2 and d_2. Thus, in the former case, the image will appear to move in the direction *opposite* to that in which the observer moves his head, those parts corresponding to less deeply seated objects moving most; and, in the latter, the image will appear to move in the *same* direction, the parts corresponding to more deeply seated objects moving most.

3. *Motions of the inverted image consequent on rotation of the eye observed.*

Real.—Supposing that the anterior pole of the eye E were to move downwards, and that the centre of the lens still remained at L and the observer at O, it will be readily perceived that the image a b d, or a_2 b_2 d_2, would move down in space, and that a would move down more than b or d, just as it moves less when the lens is moved and the eye remains steady.

If, again, the centre of the lens were at L_2 the same thing would happen, only a would move still more than it

would in the case last mentioned, while the motions of b and d would be independent of the distance between the eye and lens.

Apparent motions in the field of vision.

Supposing the lens be at L, the points P and Q, being anterior to the centre of rotation of the eye, would move down if the eye were rotated downwards; and their virtual image p and q would move down still more. The points a, b and d would also move down; and it would depend on a variety of circumstances whether the image of the retina or the image of the pupil would appear to move most. If the lens were about its own focal distance from the pupil, or perhaps a little more, the image of the pupil would probably move most; but, in such a case, the chances are that the observer would have his field of vision bounded by the margin of the lens, and not by the margin of the pupil. It will be found in general, that the image a b d not only moves down in space, but appears to move down in the field of vision; because it moves down more than the image of the pupil, or because it moves down while the lens remains stationary.

If the lens were held at L_2, there would be a motion of p_2 and q_2 in the inverted image of the pupil upwards, while P and Q moved downwards; so that the image $a_2\ b_2\ d_2$ would have an apparent motion downwards in the field of vision greater than its real one.

In both cases, then, we may expect to find the inverted images of objects deeply seated in the eye apparently moving in the *same* direction with the cornea, and those of the more deeply seated appearing to move more than those of the less deeply seated ones.

The lens is represented in the diagram as if it were aplanatic and infinitesimally thin. When we come to deal with real lenses of short focal distance, such as are generally employed in examining the inverted image, we must take into account the well-known distortions which such lenses

produce, especially when objects are seen through their peripheral parts, or by means of light which has passe through these parts. These distortions give rise to apparent motions—or, at least, to apparent changes in the relative positions of different parts of the image,—and even to changes in the positions occupied by given points in it with regard to the boundary of the field of vision.

The effect of such distortion frequently is, to exaggerate the apparent motions already described; but it occasionally counteracts them to some extent. For example, the inverted images of objects obtained by means of a convex lens appear curtailed in their dimensions towards the margin of it; hence, if the image of an object—the pupilla optica, for instance—appears to move from near the centre of the lens towards its margin, the central point will appear to approach that side which is next the margin, and so to move faster than it,—a kind of apparent motion which may, or may not, coincide with that due to variation of parallax.

The rays which are supposed to pass through the lens in Fig. 1 after coming from points in the object, would not all cross one another in accurate foci such as a, b and d in a real case; but, in consequence of spherical aberration, those rays passing through peripheral parts of the lens would cross one another nearer to it than those passing near the centre. Theoretically speaking, the observer cannot see the image with that perfect definition with which he might see a real object, because he has to do with focal areas and not with foci. Each of these areas may be of appreciable size; but all the rays which originally came from a given point in the object, and which can enter the observer's eye at one time, pass through a focal area so small that it may be regarded as a point; and the question then comes to be, whereabouts do such of the rays as enter the observer's eye cross one another?

In order to illustrate the effect which this circumstance might have, let us turn to Fig. 2, and suppose that the pupilla optica of an eye under observation, instead of being

cupped as in Fig. 1, is flat, and situated in the plane of the posterior principal focus of the eye. Let the line f h represent a portion of the equatorial plane of the lens in section; let the centre of the lens be at L, as in Fig. 1, and let P be the point in the observer's eye where the lines of visible direction cross one another,—a point a little in front of the centre of his pupil.

Rays coming from A, at the posterior principal focus of the observed eye, and passing through the points f and g, would cross one another at a, in the axis L a, and very little nearer the lens than its principal focus; while a ray passing at h would cross L a, a little behind a, and it would cross the ray g a, at *a*, still nearer the lens. Rays coming from D on the retina, and passing through f, L and g, would cross one another nearly in the point d, which is in the line of direction of the central ray L d, and at a distance from L nearly equal to the principal focal distance of the lens.

If the observer were at P, the rays from A, which would enter his pupil, would cross very nearly in a, and those from D, very nearly in d. If the lens were moved down there would be no change in the positions of a and d with regard to L, in the case supposed, provided that rays from A and D still continued to pass through the lens between f and h; but the observer's position would change with respect to both, and the rays passing through his pupil would not come from the same parts of the lens as before. Thus, supposing that the observer now occupies the position P_2 with respect to L, the rays from A which enter his pupil, instead of passing through the lens between f and g, as before, will pass, for the most part, between g and h, and will cross one another between a and *a*; and he will refer the image of A to a point near *a*. Again, the rays from D which now enter his eye, instead of passing through the lens between f and L, as before, will, for the most part, pass between L and g; but they will still cross one another in the neighbourhood of d.

If we were to draw lines from P to a and d, and from P_2 to *a* and d, we should find that the angle *a* P_2 d would be

smaller than the angle a P d, partly in consequence of the retrocession of a to *a*, and the distance between *a* and d would appear less at P_2 than that between a and d would appear at P, although it is really greater.

Although I have arbitrarily fixed upon points in the plane of the posterior focus of the eye, and upon one in a plane posterior to it, for the purpose of illustrating the subject, the general conclusions which are expressed in the following Table may be applied to the case of all objects situated at different distances behind the centre of rotation, and, so far as regards apparent motions in the field of vision, to the case of all situated behind the pupil of the observed eye; provided the circumstances are not such that the observer sees inverted images of some of them and erect images of others, at the same time.

I. Erect Images.

Observer's head moved.	*Eye under observation rotated.*
Images appear to move in the *same* direction with the observer's head; those of the *most deeply seated* objects appearing to move most.	Images appear to move in the direction *opposite* to that in which the cornea is moved —those of the *most deeply seated* objects appearing to move most.

II. Inverted Images.

1. No lens used.

Observer's head moved.	*Eye under observation rotated.*
Images appear to move in the *opposite* direction—those of *less deeply seated* objects moving most.	Images move in the *same* direction with the cornea— those of *less deeply seated* objects moving most.

2. Lens held at *less* than its principal focal distance from eye under observation.

Observer's head moved.

Images appear to move in the *opposite* direction—those of *less deeply seated* objects moving most.

Eye under observation rotated.

Images move in the *same* direction with the cornea—those of the *most deeply seated* objects moving most. Their apparent motion in the field of vision is generally the same; but it may happen that they appear to move in the *opposite* direction—those of *less deeply seated* objects appearing to move most.

Lens moved.

Images move, and appear to move, in the *same* direction with the lens—those of *less deeply* seated objects moving most.

3. Lens held at a *greater* distance from eye under observation than its own principal focal distance.

Observer's head moved.

Images appear to move in the *same* direction—those of the *most deeply seated* objects moving most.

Eye under observation rotated.

Images move, and appear to move, in the *same* direction with the cornea—those of the *most deeply seated* objects moving most.

Lens moved.

Images really move in the *same* direction with the lens, but they appear to move in the field of vision in the *opposite* direction—those of the *most deeply seated* objects appearing to move most.

Periscope of Foreign Ophthalmology.

TRANSLATIONS AND ABSTRACTS OF IMPORTANT PAPERS PUBLISHED ABROAD.

By Mr. J. Soelberg Wells.

HINTS AS TO THE USE AND CHOICE OF SPECTACLES.

By F. C. Donders.

(Graefe's Archiv, Vol. IV, Part 1.)

There are perhaps few subjects connected with ophthalmic practice which demand greater care and exactitude than the choice of a pair of spectacles. The very frequency with which we are called upon to improve vision by means of glasses is but too apt to make us somewhat careless and empirical in our mode of selection, and to prescribe those which the patient himself most fancies, even although they may not quite accord with the range of his accommodation, or with the scientific principles which should influence our choice. But how much more does not this inefficiency in selecting spectacles obtain among quasi-opticians, jewellers, etc.! This is doubtlessly often attended with the most disastrous results, and eyes, which might with proper glasses have lasted for a number of years, are soon recklessly and unwittingly destroyed through the ignorance and carelessness of unscientific opticians. In order to obviate this, I would urgently advise the adoption of a method practised in many parts of the continent. In Berlin, for instance, Von Graefe has spectacle boxes,* containing convex and concave glasses (whose number corresponds exactly with

* These boxes are made by Paetz and Flohr, Opticians, Berlin, and are invaluable to an ophthalmologist. Pillisher, 88, New Bond Street, also sells them at 4*l.* 10*s.* and 6*l.*

those kept by the opticians); from these he selects the proper glasses, and puts the number of their focal distance on a slip of paper, which the patient takes to an optician, who supplies him with the spectacles thereon prescribed.

I am fully aware that this proceeding would, at present, be carried out with some difficulty in England, owing to the fact that different opticians often number their glasses differently; but I have no doubt, that if the leading opticians would adopt a certain standard, the others would soon follow their example.

To no man are we so much indebted for having furnished us with a scientific basis upon which to treat the different anomalies of accommodation and refraction, and the consequent impairment of vision as to Donders, who, in a series of most admirable and original papers, published in the Archiv,* has fully expounded this interesting and important subject. The articles in question are, however, so concisely written, almost every sentence containing some important fact or explanation, that an attempt to give a mere resumé would be not only unjust to Donders, but would necessarily leave the reader in the dark as to many of his opinions. For this reason I have thought it best to give these papers at some length.

Donders commences his article by pointing out the influence which the state of convergence of the optic lines† exercises upon the accommodation, for the consideration of this should be one of the first points which should determine our choice of spectacles. If, for instance, a short sighted person can only see sharply and distinctly up to a distance of $4''$, $5''$, or x'', theory would apparently teach us that he requires glasses of $4''$, $5''$, or x'' negative focal distance, in order to see as distinctly at a distance. For do not the parallel rays of light which emanate from distant objects acquire through the said glass, such a divergent direction as if they came from a point $4''$, $5''$, or x'', before the concave glass?

As there exists yet a certain interval between the glass and the eye, we should naturally suppose that the spectacles

* Graefe's Archiv, vol. iv, 1. The subsequent articles in Archiv, vol. vi, parts 1 and 2, we shall treat of in another number of the Periscope.

† Donders employs the term optic lines instead of optic axes, for it has been found that the optic axis does not correspond exactly with the line of direction drawn from the macula lutea to the directly perceived point. Helmholtz calls this line of direction the optic line, and Donders follows his example.

thus selected would prove somewhat too weak. Practice, however, teaches us that this is not the case, but that they are in fact too strong, particularly in cases of extreme myopia. The reason of this is evident. In looking at near objects the optic lines are convergent, and the convergence prevents the eye from accommodating itself for its "far point." The latter is only attainable when we look with parallel optic lines towards distant objects. On the other hand, our aptitude for accommodating for near objects increases in direct ratio with the increase of the convergence of the optic lines.

We should be wrong, however, in supposing that there exists a perfect dependence between the convergence of the optic lines and the accommodative condition of the eyes. Donders has found, in illustration of this, that persons possessing normal eyes, and a good power of accommodation, can see an object at a few feet distance sharply and singly with or without convex or concave glasses (if they are not too strong); or with or without prismatic glasses (also not too strong, and applied with their base outwards). Now, in the first case, a change in the accommodation is necessitated (the convergence of the optic lines remaining the same); in the latter, the convergence is altered, the accommodation remaining the same.

Many phenomena are intimately connected with this reciprocal dependence; for instance, a short-sighted person can see better at a distance with only one eye than with both; whereas, on the contrary, a presbyopic person can accommodate better for near objects when using only one eye. The former need only make his optic lines more parallel, the latter more convergent. Donders particularly points out the curious fact that the vision of a hyper-presbyopic eye for distant objects is improved by a prism with its base turned outwards; for, in order to enjoy single vision, the patient is now forced to converge his optic lines, and this enables him to accommodate for parallel rays; whereas he requires convergent rays when his optic lines are parallel.* Through the same prism a presbyopic person will be able, of course, to read at a closer distance, and by turning it, we afford a myopic eye a more distant far point.

* Donders mentions in a note, that he has lately seen three hyper-presbyopic patients, who, in order to see distinctly at a distance, intentionally squinted inwards.

The next point of importance to be considered in the choice of spectacles is the range of the accommodative power. In speaking of its determination, Donders says:—"I take the liberty, therefore, of proposing a standard as a general expression for the range of accommodation. The range of accommodation A (which may be calculated through the distance which p and r, the nearest and furthest extreme point of accommodation, are from the anterior surface of the crystalline lens), is given by the focal distance a of an ideal lens, which, placed upon the anterior surface of the crystalline lens, would afford to rays emanating from the near point a direction as if they came from the far point. We must suppose this lens to be a meniscus placed upon the anterior surface of the crystalline, because the accommodation depends almost exclusively upon a change in the convexity of the anterior surface of the lens."

We can easily understand that a may be approximatively found by the formula $\frac{1}{p} - \frac{1}{r} = \frac{1}{a}$, and that $A = \frac{1}{a}$. The principal thing is, therefore, to determine p and r accurately. As the influence of the convergence of the optic lines complicates the question very much, Donders thinks that we must distinguish between at least three different kinds of range of accommodation (A), viz., a relative A, an absolute A', and a reduced A''. The relative is that which may be calculated by the direct determination (without the application of glasses) of p and r, according to the above formula. The knowledge of this relative range A suffices for practical purposes.

In hyperpresbyopic accommodation, we should determine the range of accommodation with the aid of a convex glass which annuls the power of accommodating hyperpresbyopically; this, however, complicates the calculation somewhat. The distance between the glass and the eye (when it is but slight) need not be taken into account.

A few examples will illustrate the determination of the range of accommodation.

I. Normal eyes which can see from an infinite distance up to 4″ from the anterior surface of the crystalline lens, have $r = \infty, p = 4, A = \frac{1}{4} - \frac{1}{\infty} = \frac{1}{4}$.*

* ∞ stands for infinite distance.

II. In myopic eyes, in which $r = 12$, $p = 4$, $A = \frac{1}{4} - \frac{1}{12} = \frac{1}{6}$.

III. In presbyopic eyes having $r = \infty$, $p = 12$, $A = \frac{1}{12} - \frac{1}{\infty} = \frac{1}{12}$.

IV. Hyperpresbyopic patients who with a convex glass of 12 inches (Paris) focus (placed half an inch before the crystalline lens), have $r = \infty$, $p = 6\frac{1}{2}$, have A about $= \frac{1}{6\frac{1}{2}} - \frac{1}{\infty} = \frac{1}{6\frac{1}{2}}$, or more accurately, if we take into consideration the distance between the glass and the eye, $= \frac{1}{5}\frac{87}{88}$.

Myopia.

Donders determines the degree of myopia by the greatest negative focal distance of the glass which is required to render the eye capable of accommodating for parallel rays of light (such as emanate from objects at an infinite distance). He supposes this glass to appertain to the crystalline lens of the eye, and, therefore, puts the distance *k*, between the glass and crystalline lens, down as increased focal distance. This focal distance *s* of the required glass *S* may $= 100''$. (*S*, therefore, $= -1 : 100$), or may even exceed this; but, in cases of excessive myopia, it may be only $4''$, $3''$, $2''$, or even less. Donders has, indeed, seen cases in which it amounted only to $1\frac{3}{4}''$ and $1\frac{7}{10}''$ in both eyes; and one case of about $1\frac{5}{8}''$ in a buphthalmic eye, the other being normal. This person was twenty years of age, and supposed herself to be perfectly blind of this eye, but was enabled (to her great astonishment), when the book was brought to the required distance, to read No. 6 of Jaeger with this glass.

The degree of myopia *M* is, therefore, $= \frac{1}{m}$, in which case $m =$ the negative focal distance (in Paris inches) *s* of the required glass. Therefore, the myopia of an eye which requires a glass of $-\frac{1}{16}$, $-\frac{1}{8}$, $-\frac{1}{4}$, $-\frac{1}{2\frac{1}{2}}$ (placed

half an inch before the crystalline), in order to accommodate with parallel optic lines for parallel rays, will be $\frac{1}{16\frac{1}{2}}, \frac{1}{8\frac{1}{2}}, \frac{1}{4\frac{1}{2}}, \frac{1}{3}$, etc.

Donders determines the glass required in myopia in the following practical manner. He examines first at what distance the patients can see large or small print sharply, and read it fluently, and then simply estimates this distance in inches. He then gives the patient the glass, whose negative focal distance equals or slightly exceeds this distance, and lets him look at a board placed at a distance of 7 — 8 metres (about 20 — 24 feet), on which are written Nos. 19 and 20 of Jaeger's test types, and besides these Nos. 21, 22, 23, and 24 (progressing in the same ratio as Jaeger's). He then alternatingly places glasses of very great positive or negative focal distance before the spectacles, and inquires whether they render the letters more distinct or indistinct. If vision remains as good when positive glasses are held before the spectacles, then the latter are too strong; if, on the other hand, concave glasses improve the vision, the spectacles are too weak. In slight cases of myopia we may acquire a still greater amount of exactitude by approaching or removing the glass a little.

Donders illustrates this method by the following examples.

If a myopic patient sees distinctly up to a distance of 8″, then his myopia $= \frac{1}{8 + k.}$ He consequently tries glasses of $-\frac{1}{8}$ *i. e.* 8″ negative focal distances. *a.* The patient distinguishes things sharply at a distance, and reads No. 19 or 20. Glasses of $-\frac{1}{80}$ do not improve his sight, whereas those of $\frac{1}{80}$ render it somewhat indistinct. Consequently the myopia $= 1 : (8 + k)$ and glasses $= -\frac{1}{8}$ are required. *b.* The patient only recognizes No. 23, glasses of $-\frac{1}{80}, \frac{1}{60}, \frac{1}{40}$, increasingly improve his sight, $-\frac{1}{30}$ less so. This myopia is consequently $\frac{1}{8 + k} + \frac{1}{40}$

therefore about $\frac{1}{6\frac{2}{3} + k}$. $S = -\frac{1}{7}$ is tried, and neither weak negative or positive glasses render any improvement. *c.* The patient declares that he can see very sharply, but yet can only see No. 22. Slightly negative glasses act disadvantageously. $S = \frac{1}{80}$ improves vision somewhat, $= \frac{1}{48}$ still more so, $= \frac{1}{40}$ most of all, and with the latter he can read No. 20, or even No. 19. His myopia is consequently $= \frac{1}{8 + k} - \frac{1}{40}$, therefore, about $= \frac{1}{10 + k}$; accordingly $S = -\frac{1}{10}$ is tried, and neither negative or positive glasses further improve the sight. *d.* The patient reads No. 1 at a distance of 5″, with $S = -\frac{1}{6}$ he only distinguishes No. 24 at 7 metres distance (about 20 feet). Slightly concave glasses render the images only more indistinct. Positive glasses, however, improve vision, and $\frac{1}{18}$ most so. His myopia is therefore $= \frac{1}{6 + k} - \frac{1}{18}$, hence about $= \frac{1}{9 + k}$. He requires $\frac{1}{9}$, and no glasses render any further improvement. But he only sees No. 23 and No. 22 indistinctly, therefore he is suffering also from amblyopia. These cases are, indeed, often met with. Donders remarks, however, that in cases of excessive myopia, *e. g.* $M = \frac{1}{4}$ or $\frac{1}{3}$ patients can but seldom read No. 19 or 20, be their glasses never so correctly chosen. This is most likely owing for the greater part to the smaller and less perfect images which the retina receives on account of the displacement backwards of the optic centre (knotenpunkt), and the aberration caused by such strong glasses, and we are therefore for all this, not yet justified in assuming that amblyopia exists.

Donders attaches very great importance to the exact determination of the degree of myopia. We should generally endeavour to select such spectacles as will exactly enable the eye to accommodate for parallel rays. If the glasses are too weak, the patient does not enjoy all the

advantages which he should derive from them, and the injurious, or at all events, fatiguing habit of improving vision by nipping the eyelids together, etc., will remain; and the eye also exercises itself better in exact perception and discernment when the retina continually receives sharply defined images. If, on the other hand, the glasses are too strong, the detriment will be still greater, for then the accommodative power is necessarily already strained when the optic lines are parallel, and this (as we can easily prove by using slightly concave glasses for a non-myopic eye) is exceedingly fatiguing.

It is further of importance to determine after the lapse of some time, whether or not the myopia has remained stationary. We need not be at all alarmed at a slight stationary myopia; but, on the other hand, a progressive myopia is always dangerous, and demands care, and often indeed active treatment, in order that a limit may be placed to its further development.

Donders considers it advisable that short-sighted patients should be allowed spectacles with which they can see objects sharply at an infinite distance; and most ophthalmologists agree with him in this point; opinions, however, differ very much as to the advisability of furnishing myopic patients with glasses for the purpose of reading, writing, etc. Donders himself formerly strongly objected to it, for he argued thus, "in order to prevent the advance of the myopia, it is above all things necessary to avoid, as much as possible, accommodation for near objects; short-sighted persons, when using concave glasses, are easily misled into holding the objects nearer the eye than is essentially necessary for distinct vision; the unaided eye will not, on the other hand, if the far point lies already very near the eye, readily advance the object within this far point." Since then he has, however, completely changed his opinion upon this subject, and for the following reasons: 1st. Because strong convergence of the optic lines is necessarily paired with straining of the accommodation for near objects. The convergence itself is not the immediate cause; but through association brings into play the mechanism of accommodation for near objects, for we must remember that convergence always exists during reading, writing, etc.; one is consequently always accommodated for a nearer point, than that in which the far point lies when the optic lines are parallel or less convergent. This difference, which is greater in myopic than in normal

eyes, is particularly great when the myopia is excessive, *e.g.* $M = \frac{1}{3}$ or $\frac{1}{4}$, and we find that such patients can see sharper at a greater distance when using only one eye; so that they, often of their own accord, only direct one eye upon the object and have a divergent squint when looking at near objects; in the most excessive degrees of myopia, the convergence of the optic lines has, even for the far point, become totally impossible. In other cases, again, Donders says that a convergent squint developes itself, but only when looking at far objects; whereas both optic axes, and in this case without any particular straining of the accommodation, are for near objects directed upon the latter. But, independent of this, and even in slight cases of myopia, as in $M = \frac{1}{10}$ the convergence is greater than in normal eyes. The accommodation for a nearer point, when the optic lines are convergent, is an associated movement, not arising from the convergence itself, but the straining of the accommodation during convergence exists in the eye itself, and may, therefore, easily bring about an increase of the myopia. Besides this, the pressure of the muscles is greater during convergence than when the optic lines are parallel. Donders has found that phosphènes appear more readily upon a certain amount of pressure when the optic lines converge. Von Graefe has also noticed* that while, on the one hand, in cases of paralyses of the muscles, the adjustment of the eye during associated movements may be perfectly normal in a certain direction; the eye, on the other hand, often deviates when the same direction is demanded for the purpose of accommodating for a near object; he has, besides this, found that the venous pulse increases during accommodation for near objects, and this speaks undoubtedly for an increase of lateral muscular pressure. Donders remarks that this increased pressure of the muscles, to which we expose short-sighted persons when we do not furnish them with spectacles, must necessarily induce the development of staphyloma posticum.

His second reason for furnishing spectacles for the purpose of reading and writing is the position of the head which these patients indulge in when working without glasses. They generally work with their heads bent forwards and

* Archiv, vol. i, pt. 1, pp. 36 and 53.

downwards, which must necessarily cause an increased flow of blood and an increased pressure of the humours of the eye, and promote very much the development of sclerotico-choroiditis posterior, effusion of blood and detachment of the retina. For this reason he advises all short-sighted persons to read with their head well thrown back; best of all leaning back in their chair with the book held in their hand; and to make use of a sloping desk in writing.

With regard to the strength of the glasses, several points are to be considered. If the patient is young and possesses a normal accommodative power $\left(e.\,g.\,\frac{1}{3}\text{ or }\frac{1}{4}\right)$ and his myopia is only $=\frac{1}{10}$, and there is no sclerotico-choroiditis posterior, he should wear spectacles $-\frac{1}{10}$, and leave them off only when he is not using his eyes. If there is a greater degree of myopia, for instance, $=\frac{1}{3}$ to $\frac{1}{6}$, and particularly if the accommodative power is diminished to $A=\frac{1}{6}$, or $\frac{1}{12}$, or more, Donders thinks it injudicious and often indeed even dangerous to permit the patient to use the same glasses for near objects which he uses for seeing at a distance. The reason for this is evident. In great myopia we generally find that sclerotico-choroiditis posterior and staphyloma posticum are already very much developed (particularly in a somewhat advanced period of life), and it is, therefore, most desirable that all accommodation for near objects should be avoided. In cases of defective accommodative power, say, for instance, of $\frac{1}{12}$, vision for an object at a foot distance (the eye being provided with spectacles for distant objects), demands the total energy of the accommodative power, and this not only directly tires the eye, but also gradually diminishes the still remaining energy of the power of accommodation, and should make us fear a gradually increasing myopia. Donders, however, thinks it still worse to let excessively myopic patients perform all work at a short distance without spectacles; for in such a case all the disadvantages which arise from the convergence of the optic lines, the consequent accommodation for near objects, and the bending forward of the face, would be brought into play. In order to avoid these

disadvantages, we must give the patient spectacles which would bring the far point of the accommodation to 10″ or 14″.

We can easily find the requisite glasses. If, for instance, the myopia is $M = \frac{1}{4}$, the spectacles to see at 12″ distance will be about $S = -\frac{1}{4} + \frac{1}{12} = -\frac{1}{6}$, *i. e.*, of 6″ negative focal distance. We shall, however, afterwards find that he will not be able to see perfectly with this at a distance of 12″, for the convergence of the optic lines for a distance of 1′ is necessarily accompanied by an accommodation for a nearer point.

We must also particularly warn patients, when ordering them glasses, not to approach the objects nearer than is essentially necessary for distinct vision, otherwise the accommodation will be strained. If amblyopia (generally dependent upon sclerotico-choroiditis posterior) is so much developed that patients cannot, with the proper glasses, easily read No. 3 — 5 of Jaeger at a distance of 12″, we must be exceedingly careful, and if this amblyopia does not yield to artificial leeches, eye douches, and rest of the eyes, it will be necessary to forbid the use of the eyes for all near objects. If we give them concave glasses, which bring their far point to 10″ — 12″, the patients strain their accommodation, as Von Graefe points out, in order to see the object more distinctly and under a greater angle. If we allow them to work without spectacles, they cannot easily adjust themselves for their far point; and besides this labour under the disadvantage of the strong convergence if both eyes are used, and at all events, under that which arises from bending the head forwards. Donders says, that such eyes, if they are permanently used, either with or without concave glasses, for near objects, are generally destroyed in the course of a few months or years.

Presbyopia.

It has been wrongly supposed by some that $\frac{1}{r}$ does not decrease in advancing years, but that the two boundary-points of accommodation approach each other, so that $\frac{1}{r}$

increases, while $\frac{1}{p}$ decreases. But we find, that the range of accommodation decreases already in adolescence. In normal eyes this is brought about by the fact that $\frac{1}{p}$ decreases far more rapidly than $\frac{1}{r}$. A slight degree of myopia often decreases, sometimes even disappears, as the person gets older. The far point is in fact removed further from the eye.

We also often see that old persons suffer from hyperpresbyopia, *i. e.*, they require convex glasses in order to see sharply at a distance, whereas they formerly enjoyed (according to their own account) normal vision.

Donders considers an eye to be presbyopic when $p = 8''$, for many persons then begin to complain that reading or working at near objects becomes irksome if continued for some time; reading small print by candle light proves particularly trying and annoying to them. It therefore appears right to let presbyopia commence here. The degree of it he determines thus. If $p > 8 = 8 + n$, then the presbyopia is $Pr = \frac{1}{8+n} - \frac{1}{8}$. If, consequently, the near point is at $12''$ from the anterior surface of the lens, $Pr = \frac{1}{12} - \frac{1}{8} = -\frac{1}{24}$. A glass of $\frac{1}{24}$ will then bring the near point again to about $8''$. The increased convergence of the optic lines does not exercise much influence in this case, because a convergence for $8''$ signifies but little, and particularly because the range of accommodation is but slight in aged presbyopic patients, and the influence of a certain convergence appears to increase or diminish with it.

As soon as the presbyopia begins to be at all annoying he advises the use of convex glasses, for he has found that if presbyopic patients continue to work without them, the accommodative power quickly diminishes, and the near point in particular very soon recedes further from the eye. The reason of this is to be partly sought for in the defective convergence of the optic lines, owing to which the accommodative power is limited in its action, and consequently is not so well exercised as when convex glasses are used. By this means alone can we uphold a certain connexion between the convergence of the optic lines and a certain

tension of the power of accommodation, and prevent an excessive amount of tension with but slightly convergent optic lines. This excessive straining often causes congestion of the retina, unpleasant sensitiveness of the eye, and even ciliary neurosis, which is then spoken of as nervous headache. Donders has frequently cured such headaches in aristocratic ladies by a proper pair of spectacles, after they had been in vain seeking relief from homœopathic practitioners.

In prescribing spectacles, we must pay particular attention to the amount of accommodative power which the eye possesses. If it is tolerably good, we may bring the near point to 8″; if it is, however, greatly diminished or almost null, it will be advisable to order glasses which will make $p = 12''$. Between 8″ and 12″ the proper distance generally lies. The importance of attending to this fact must be evident enough. We desire with a pair of spectacles to see at about the distance of a foot, for this distance is most convenient in reading, writing, etc. Now, if a person possesses hardly any accommodative power, and we bring his near point to about 8″ by means of glasses, his far point will be, perhaps, at 9″ or 10″, and this is certainly insufficient. If, on the other hand, his accommodative power is tolerably good, for instance if in a case of $\mathrm{Pr} = -\frac{1}{24}$, $\mathrm{A} = \frac{1}{12}$, the far point may be brought (if the near point is at 8″) to 24″ $\left(\frac{1}{8} - \frac{1}{12} = \frac{1}{24}\right)$, and if the patient now brings the object to about 12″, he will then use $\frac{1}{12} - \frac{1}{24} = \frac{1}{24}$ *i. e.* the half of the total range of his accommodative power $= \frac{1}{12}$. He cannot, without tiring his eye, permanently use more. We see from this that if the accommodative power is moderate, we should, with spectacles, bring the near point somewhat nearer than the usual distance at which we read. Further on, we shall find that this is particularly applicable to cases of congenital hyperpresbyopia, and even in the commonest form of hebetudo visus.

Donders finally reminds us that not unfrequently myopia and presbyopia may exist simultaneously in the

same eye. As soon as $p > 8''$, presbyopia exists, and if $\frac{1}{p}$ is at the same time greater than $\frac{1}{a}$, myopia is also present. We often meet with this in old patients who have suffered from slight myopia in their youth. Donders, a short time ago, saw a man in whom $M = \frac{1}{24}$, $Pr = -\frac{1}{24}$ and $A = \frac{1}{24}$. His near point was namely at 12″, his far point at 24″. He says also that it may, in isolated cases, occur in youthful individuals, who whilst suffering from a slight degree of myopia, have chanced to lose their power of accommodation through some affection or another.

Hyperpresbyopia.

This may generally be diagnosed by the mere shape of the eye. It is often mistaken for myopia associated with a certain amount of amblyopia; for the patients can only see distinctly when the object is held quite near to them, and this is supposed to point to myopia; whereas, the fact that they cannot distinguish the finest print is apparently due to the presence of amblyopia. But "*Hyperpresbyopia is that condition in which the eye accommodates or is at least capable of accommodating itself* (*the optic lines being parallel*) *for more or less converging rays.*"

Donders divides hyperpresbyopia into three classes:— 1. The absolute; 2. The relative; 3. The facultative.

In the first form there is neither a far nor a near point, both being negative, there is not a single point at which the patient enjoys distinct vision.

In *relative* hyperpresbyopia there is likewise no single point in which the objects can be distinctly seen with both eyes at the same time. The patients, therefore, voluntarily squint inwards, and are thus enabled (when the optic lines converge) to accommodate for a certain point; the latter is however, much further removed than the point in which the optic lines cross each other. But Donders thinks, however, that in *absolute* hyperpresbyopia, patients have never seen any object sharply without some optical aid, and he presumes that the amblyopia which generally accompanies hyperpres-

byopia may partly be owing to this, for vision often improves after the use of convex glasses.*

The degree of hyperpresbyopia is to be determined by the focal distance of the strongest convex glass, with which the patient can still see distinctly at a distance. For instance, the expression $\text{Hpr} = -\frac{1}{12}$ means such a degree of hyperpresbyopia, that glasses $= \frac{1}{12}$ are the strongest with which he can see distinctly at a distance. But many presbyopic patients accommodate more or less hyperpresbyopically. They have, for instance, $p = 12$, therefore $\text{Pr} = -\frac{1}{24}$, and $\text{A} = \frac{1}{9}$. They are therefore able, even apart from the convergence of the optic lines, to see distinctly at a distance with glasses of $\frac{1}{9} - \frac{1}{12} = \frac{1}{36}$. This power of accommodating hyperpresbyopically is met with (apart from presbyopia) when for instance $p = 6$ and $\text{A} = \frac{1}{5}$, in which case the person may see at a distance with $\text{S} = \frac{1}{5} - \frac{1}{6} = \frac{1}{30}$. With such a glass he will generally see more distinctly and better at a distance. We shall see afterwards that almost all cases of so-called hebetudo visus belong to this category, but they do not belong to the true hyperpresbyopia; and Donders places them in the third category of *facultative hyperpresbyopia*.

The eyes in question are able so to relax their power of accommodation, that even with a weak convex glass before them they can, with parallel optic lines, bring parallel rays to a focus on the retina, but they can do so also without a convex glass with or without any particular trouble, and this the veritable hyperpresbyopic patient can never do.

The fact that hyperpresbyopic persons can read better at a very short distance than at 8″—12″ is explained by Von

* In a note Donders says, "It however happens that hyperpresbyopic persons find their vision considerably improved by a stenopaic apparatus, (or even through nipping the eyelids together,) even although they are supplied with the most suitable glasses. In this case, the reason of the imperfect sight must, partly at least, be evidently sought for in the 'perfectly transparent' media of the eye, and spectacles of a different curvature than the spherical, would most likely answer the purpose most perfectly. I shall, however, return to this important topic at a fitting opportunity.

Graefe to be due to the fact, that when the objects are brought very near to a hyperpresbyopic eye, the circles of dispersion (zerstreuungs kreise) increase in size comparatively more slowly than the size of the retinal images; and owing to this, the circles of dispersion of the retinal images of objects standing close together (such as letters, lines, etc.,) and held at a short distance from the eye, allow more easily of interspaces than when the objects are held at a greater distance. Donders thinks it to be also partly due to the narrowing of the pupil, which occurs during our looking at near objects, and the consequent diminution of the circles of dispersion (the condition of the refracting media remaining the same), and particularly also to the energetic action of the power of accommodation during the greatest possible convergence of the optic lines. The retinal images of hyperpresbyopic persons, possessing a good power of accommodation, are not therefore so imperfect as many suppose. A good power of accommodation is, however, necessary for this. Donders has never seen aged hyperpresbyopic patients able to read near at hand. Even aged presbyopic persons are incapable of it, owing to the small amount of their accommodative power.

If the hyperpresbyopic patient enjoys a normal power of accommodation, and is free from amblyopia, we can easily calculate what glasses he requires. For $Hpr = -\frac{1}{10}$, 10 will be the glass required; and if his accommodation-power is good, this glass will suit him for far and near objects; and if $A = \frac{1}{6}$ he will see with it at 12″ distance, making use at the same time of about half his power of accommodation. $S = \frac{1}{10}$ will assimilate his eye to one which does not require spectacles either for far or near objects, and we surely cannot place his eyes under more favourable conditions. The glasses are only to be laid aside when the eyes are not used. If, on the other hand, his accommodation is but slight, he will require a stronger glass for near vision. This is to be found thus: "The nearest point which is attainable when the eye is furnished with the strongest glass which it can bear for distant vision, affords us a clue in this case. Suppose this strongest glass to be $\frac{1}{10}$, and let it be assumed

that with it he can but see at 24″, (his accommodative power amounting only to $\frac{1}{24}$) it will then be advisable that his near point should be at about 10″, and for this purpose $\frac{1}{10} + \frac{1}{10} - \frac{1}{24} = \frac{1}{6\frac{6}{19}}$ or about $\frac{1}{6\frac{1}{2}}$ will be necessary. With this glass he will be able to see certainly at $\left(\frac{1}{10} - \frac{1}{24} = \frac{1}{17\frac{1}{2}}\right)$ 18″ distance, and he will not be fatigued by looking at objects at 12″ distance." If there is also amblyopia, we may have to go further; but, at all events, our object must be to enable the patient to read tolerably large print so that he may exercise his sight without fatigue.

Hebetudo visus.

Donders divides those cases of hebetudo in which the patient can only accommodate for a short time for near objects (reading, writing, sewing, etc.,) into two classes:

I. The case in which the cause is not situated within the limits of accommodation—under this head are to be noticed two classes of cases. 1. Those in which every kind of work in which the object has to be held near the eye, produces an unpleasant feeling in the eyes, together with redness, etc.; this soon forces the patient to abstain from work, and then after he has rested his eyes for a short time, these sensations vanish; at times they may, however, assume a more permanent character. Donders does not know exactly where to localize this affection; he does not believe that it was originally due to hyperæsthesia of the retina. The limits of accommodation are normal; convex glasses never improve sight, a slight degree of myopia is not unfrequently present. 2. The next class of cases which come under this head are those to which Von Graefe has paid so much attention, viz., the insufficiency of the recti interni muscles, owing to which the requisite amount of convergence for looking at near objects is impossible. These patients, if suffering from a good deal of myopia, generally only make use of one eye when looking at near objects, and thus escape the symptoms of hebetudo.

II. Those far more frequent cases in which the boundaries of accommodation differ from their normal condition,

Donders has found that in almost all these cases the boundaries of accommodation (the range of accommodation remaining about normal) are removed further from the eye.

Let us, for instance, suppose that $A = \frac{1}{6}$. The patient possesses, however, the power of accommodating hyperpresbyopically, so that he can see very well, perhaps even better, at a distance with $S = \frac{1}{24}$ than without a glass. P is, therefore, about $= \frac{1}{6} - \frac{1}{24} = \frac{1}{8}$; $p = 8$. Although such a person may at first accommodate very well for an object at 8″ distance, it is perfectly certain that he suffers from hebetudo. The reason of this is evident; he permanently makes use of the greater part of his power of accommodation. If he holds the object at 12″ distance, he uses $\frac{1}{24} + \frac{1}{12} = \frac{1}{8}$ Now, as $A = \frac{1}{6}$, he permanently uses $\frac{3}{4}$ of his accommodative power (supposing that he holds the object at 12″ distance), this being far too much, the accommodative apparatus soon becomes fatigued. There is, however, yet a second reason for this; viz., he uses $\frac{3}{4}$ of his accommodation without a corresponding convergence of the optic lines. If we apply a prismatic glass in such a manner that he is obliged to converge the optic lines more in order to see at a distance of 12″, we find that he will be enabled to work much longer. The following is the reason. Hyperpresbyopic patients are already obliged to strain their accommodation, in order to see distant objects distinctly, while their optic lines are parallel, for in these cases the right balance between the convergence of the optic lines and the accommodation is annulled; this straining necessarily increases in proportion as the object is brought nearer and the greater the consequent convergence becomes. Although Donders has for the sake of convenience assumed that the patient can see distinctly at 8″ distance, he points out that it is hardly accurate, for in order to do this he would require to use the whole energy of his accommodative power, and this he cannot do with his optic lines converging to 8″. If his power of accommodation $= \frac{1}{6}$, he must converge his optic lines to

6″ in order to use the whole of it. It is, therefore, evident that at a distance of 12″ he uses far more than $\frac{3}{4}$ of the accommodative energy disposable for this distance. For this reason the hyperpresbyopic accommodation may be much less, and may, nevertheless, under the above circumstances, give rise to the appearances of hebetudo.

The reason of hebetudo is, according to Donders, to be sought for in the following fact. "*In consequence of the facultative hyperpresbyopia, it becomes necessary to accommodate, at every degree of convergence, for a distance approximated to the near point* (*of the territory of accommodation corresponding to this convergence*), *and consequently to make use of very nearly the maximum of the power of accommodation disposable for every degree of convergence, and it is just in this that we must seek for the reason of the hebetudo.*" Where no hyperpresbyopia exists, the maximum of the power of accommodation corresponding to the angle of the convergence is only made use of in accommodating for the near point, and every one suffers, without doubt, more or less from hebetudo when accommodating for this point.

If we wish to illustrate the symptoms of hebetudo in our own persons, we have but (if our eyes are normal) to put on a pair of spectacles of $-\frac{1}{20}$ or $-\frac{1}{40}$, according to the greater or less development of our power of accommodation; if we are shortsighted, it need be only a glass which is $-\frac{1}{20}$ or $-\frac{1}{40}$ too strong. Few eyes can hold out against $-\frac{1}{20}$. We are now enabled to accommodate hyperpresbyopically (facultative hyperpresbyopia), so that we can see better at a distance with $S = \frac{1}{40}$ or $= \frac{1}{20}$; besides which a prismatic glass, applied in such a manner as to necessitate a convergence of the optic lines, is found agreeable, for it re-establishes the natural connexion between the tension of the power of accommodation and the convergence of the optic lines,* the near point lies further from the eye, and

* It does not tire an eye to accommodate for the furthest point which it can attain with a certain amount of convergence. Many myopic patients undoubtedly do this. The reverse cannot, however, be done for a continuance.

we cannot use the total accommodative power, and a prismatic glass facilitates vision. If we, on the other hand, continue to read, etc., without a prismatic glass, the necessity for removing the object further from the eye soon makes itself felt, and finally, the whole train of symptoms of hebetudo visus show themselves.

We do not meet with the symptoms of hebetudo in presbyopia which gradually developes itself in advanced age, because the accommodative power has simultaneously diminished, and because a hyperpresbyopic accommodation does not occur at the beginning of presbyopia.

But an eye which can accommodate pretty strongly for convergent rays is always more or less fatigued, and in such cases there is no distance at which the patient sees distinctly and comfortably. Donders thinks that the reason why persons, who can accommodate hyperpresbyopially, so often declare that they can see without any difficulty at a distance, is that they do not constantly endeavour to see distinctly. They, in fact, from time to time yield (their optic lines being parallel) to their natural hyperpresbyopic accommodation, and in this may rest their accommodative apparatus.

He considers that we should distinguish between the primary and secondary appearances of hebetudo. The former do not yield to any treatment; the latter may generally be alleviated, perhaps cured; for they are most likely caused by a state of irritability and secondary relaxation of the muscular accommodative apparatus, which is frequently accompanied with congestion of the choroid and irritation of the retina. These symptoms, however, generally disappear when the accommodation is rested for some time, and if this rest were continued for a long time, there is little doubt that they would permanently disappear altogether. Donders thinks that, as the symptoms of hebetudo only show themselves when it is necessary to accommodate for any length of time for near objects, most likely many people (whose pursuits do not require accommodation for near objects) suffer from the dislocation of the boundaries of accommodation, (accommodations gränzen) which we have instanced as the general cause of hebetudo, without being aware of it.

We find, however, on the other hand, that those who have to work constantly at near objects, *e. g.*, engravers, watchmakers, milliners, etc., continually complain of hebetudo. For such a person those glasses are most suitable for distant objects, which completely annul the hyperpresbyopic

accommodation; and Donders recommends their use (on account of the continued relaxation of the power of accommodation) for vision with parallel optic lines, in all cases of facultative hyperpresbyopia; but he considers them insufficient for near objects. In order to enable the patient to accommodate for near objects, he must make his eyes myopic, so that his far point lies at 12″, or at most at 16″, from his eye; for only in this case do they cease using their power of accommodation when looking at near objects.

By having the glasses slightly blued the sensibility of the retina will be reduced. After a time we may prescribe weaker glasses without causing the patient any annoyance, and this proves that the secondary symptoms begin to yield. When the latter have completely disappeared, he may indeed be able again to read without glasses; any excess in this will, however, soon re-awaken the secondary symptoms. Donders advises that those spectacles should be used which neutralize the hyperpresbyopic accommodation, and if $A = \frac{1}{7}$ or $\frac{1}{8}$, they may finally be used as well for distant as for near objects. If A be less, we should give the patient stronger glasses (proportionate to his power of accommodation) for near objects.

*EXTRACTS FROM VON GRÆFE'S THERAPEUTIC MISCELLANIES.**

I.—Simon's Glycerine Ointment.

Dr. Simon has at length succeeded in combining glycerine with amylon, in the form of an ointment. The glycerine, which should be very pure, is to be heated to 70° of Réaumur, and the starch granules be then allowed to swell up in it. The proportion is 5 parts of glycerine to 1 of starch.

The advantages of this ointment over one of a greasy nature are, that it is soluble in water, always retains the same consistence in any temperature, and that it does not become rancid. Its decomposition shows itself only by the formation of a thin layer on the surface of the ointment; and if this layer is mixed up with the rest of the ointment,

* Græfe's Archives, vi, 2, 122.

by means of a probe or small spatula, we may continue its use without any detrimental effect.

Von Græfe has tried it extensively, and prefers it in many cases to any other vehicle. In phlyctenular conjunctivitis and its derivatives, for which the red precipitate of mercury is so excellent a remedy, he has found great advantages in combining this with the glycerine ointment; for it is readily dissolved by the watery secretions of the conjunctiva, which is not the case with fatty ointments, and its consistence is such, that it is easily and equally disseminated. But on these accounts a red precipitate ointment made up with glycerine, is relatively stronger than one made up with fat. Consequently, an ointment of 2 grains of red precipitate to 1 drachm of glycerine, would be equivalent to 3—4 grains of red precipitate made up with a drachm of adeps.

He has found it advantageous also in those cases in which there is a tendency to conjunctival swelling or granulations, for here the conjunctiva bears it far better than a fatty constituent. Besides which, there is the manifest advantage that the nitrate of silver, sulphate of copper, or acetate of lead (or any substance which the exigencies of the case may require), are really held in a state of solution in this ointment.

We can also combine atropine with this vehicle, and Von Græfe considers this of importance, from the fact, that he suspects atropine to be but too often the carrier of contagion in hospital out-patient practice. How often is not the atropine brush used indiscriminately for all kinds of cases, contagious or non-contagious? He prefers, however, fatty ointments in cases of seborrhœa palpebralis or blepharo-adenitis in combination with nitrate of silver or acetate of lead; for in these cases the fat is particularly useful in dissolving the crusts formed on the edges of the lids.

II.—On the use of warm or lukewarm fomentations in certain Ophthalmiæ.

Although at the first glance this remedy may be deemed but of slight importance and trivial value, capable of but little good, incapable of much evil, this is really not the case, for it may indeed form a most valuable or a most dangerous agent. For instance, in cases of conjunctival blenorrhœa, warm fomentations are often accompanied with the most disastrous results, whereas cold applications act

most favourably, and in the slighter cases often suffice for a cure.

Von Græfe has experimented much with warm fomentations, and has in some classes of cases found them quite indispensable.

They may, according to him, be employed with advantage.

1. For a peculiar and highly dangerous disease of the cornea, which he designates the "non-irritable purulent infiltration of the cornea." The symptoms of this important affection he describes as follows. "It generally attacks children under eight years of age, a small yellow spot is seen in the centre of the cornea, which rapidly increases in size (attaining often within two days a line in diameter). If we see the patients at this stage we are at once struck with the general condition of the eye, the utter want of the symptoms of injection and irritation, etc., which are premonitory of the circumscribed inflammatory infiltration of the cornea. There is but slight lacrymation, the eye is opened freely even in a strong light, the subconjunctival injection is very slight indeed, the conjunctiva perfectly free. With regard to the infiltration, one thing is particularly characteristic, viz., that the purulently yellow portion, extending deeply into the cornea, and more or less ulcerating, passes over at once into a normally transparent portion; whereas in the inflammatory infiltration, it passes over into a gray swollen nimbus, whose extent indicates the low changes in the parenchyma which have not yet led to the formation of pus. If the disease be left to itself, it may pass over under certain changes of appearance into a cure. In the severer cases, however, the yellow purulently infiltrated portion of cornea increases more and more in extent, betraying, except at the later stages, but little disposition to perforate. The formation of pus, as has been before mentioned, extends from the very commencement deep into the cornea, the epithelial layer of the membrane of Descemet even becoming soon involved, so that the aqueous humour assumes a diffusely yellowish tint, without, however, always depositing an hypopyon. The iris becomes swollen and peculiarly yellow, or reddish yellow, without, however, showing any of the symptoms of an acute iritis, such as posterior synechia, etc. But whether this yellow discolouration of the iris, in the formation of which (as is shown by oblique illumination) hyperæmia of the larger vessels takes an active part, is dependent upon a real formation

of pus in it, or upon some other changes in the parenchyma, I do not know, not at present possessing any decisive anatomical preparations. If the process passes over into a cure, be it spontaneous, or through the assistance of art, this is brought about invariably, through the partial appearance of those symptoms of irritation which have hitherto been wanting, and the formation of a grey slightly swollen nimbus around the purulently infiltrated portion, (as in common inflammatory corneal infiltration) to which it now assumes a greater and greater resemblance. This affection has, in contradistinction to the common inflammatory infiltration of the cornea, a decidedly malignant tendency. Whilst the latter leads to purulent destruction only, through an excess of the inflammatory irritation, showing however, in the main an inclination to limit itself to certain sections of the cornea, and even in case of a loss of substance, extending rather in depth than in circumference, we find that just the reverse obtains in the affection of which we are treating. The whole assumes from the commencement a suppurative, ulcerative character, and the tendency to spread circumferentially."

Von Græfe chanced, three years ago, to have so great a number of children afflicted with this affection under his care, that he could not but look upon it as epidemic. Whilst the milder cases got well by merely guarding them against noxious influences, together with closure of the lids, instillation of atropine and local depletions, the more severe (in which the purulent infiltration was more extensive) set all these remedies at defiance. Whilst cold compresses exercised a most deleterious influence, warm fomentations were found to act favourably. Von Græfe, therefore, gradually raised the temperature of the warm chamomile fomentations to $25-32^{\circ}$ of Réaumur. The less the irritation, the higher should the temperature be. The fomentations should be changed every five minutes, and be desisted from for a quarter of an hour at the expiration of every hour. As soon as the greyish nimbus of demarcation is formed and the purulently destroyed (necrosed) portions of the cornea commence to be thrown off, the warmth of the fomentations and the duration of their application should be diminished. For if this is not done, the inflammatory reaction will be excessive. In fact, it may even be necessary to have recourse to the opposite plan of treatment (cold applications, leeches, etc.), when the affection has been led over into the second

(inflammatory demarcation) stage, and the symptoms of irritation exceed a certain *juste milieu*.

He has also found warm fomentations most efficient in those cases in which, together with a neglected traumatic loss of substance, as we often see in country people, a purulent infiltration in the cornea shows itself without any particular symptoms of irritation; the tendency to spread circumferentially, becoming more and more prominent, the aqueous humour and iris assuming a yellow hue, etc.

But here, of course, when the pus in the anterior chamber has exceeded a certain amount, paracentesis or iridectomy will be found indispensable.

To sum up. "*The methodical application of warm fomentations assists materially in bringing about the desired demarcation in all the non-irritative purulent infiltrations of the cornea, which show a tendency to spread circumferentially.*"

2. Warm fomentations are most serviceable in those cases in which, after an accident or an operation a circumscribed corneal infiltration shows itself, where very violent pain does not yield to one or two applications of leeches, where the customary cold applications either do not alleviate at all or only temporarily, and where finally a circumscribed portion in the infiltration becomes yellowishly discoloured. After the fomentations have been applied for 12—24 hours there will generally be a diminution in the irritation and the process on the cornea begin to be circumscribed; when the desired effect has been attained we must cease their application.

3. In those cases of malignant ulcers of the cornea in which there is but little tendency to formation of pus, but a tendency to progressive destruction of the cornea, not only in depth but in circumference.

4. In the diffuse suppurations of the cornea which sometimes unfortunately threaten or occur after extraction. Von Græfe has found them here of great advantage, particularly in old decrepid people, in whom, after passing 18—24 hours without the slightest pain, we notice much swelling of the upper lid and a too great conjunctival secretion. If these symptoms are not due to an inaccurate adaptation of the corneal flap (for which compresses are the best remedy), he applies warm fomentations periodically, and paints tincture of iodine on the lids.

But although we cannot expect much good even from their application, when there is a plentiful thin secretion

from the conjunctiva, serous chemosis, yellow hue of the whole of the cornea, and a more or less circumscribed abscess, we yet find that they will limit these processes to the anterior portion of the eye-ball, and thus spare the patient the frightful sufferings of panophthalmitis.

5. They are also useful in any obstinate cases of granulations with or without pannus, for it is a well-known fact that, under these circumstances, a certain amount of conjunctival swelling is very propitious. Von Græfe thinks that the spontaneous curability of acute granulations (which often require but little, if any, therapeutic aid) depends on this. Whereas, on the other hand, we find that the less conjunctival hyperæmia there is, particularly during the stage of development, the more do the granulations develope themselves and attain the type of the so-called trachom granules. It has been lately shown, particularly in Belgium, that the development of a diffuse hyperæmia of the conjunctiva brought about by inoculation not only exerts a most beneficial influence upon secondary pannus, but also upon the acute granulations. The curative effect of the periodical application of sulphate of copper is similar in nature. And the same is the case with warm fomentations, which remedy links itself on to the treatment by inoculation, and although it cannot supplant this remedy in all cases, it yet has the great advantage of being free from any danger. This is of the more importance in Berlin, where, owing most likely to the climate, diphtheritic inflammation often supervenes on the inoculation of blenorrhœa.

Finally, having observed that patients suffering from the very obstinate diffuse non-vascular form of keratitis, have been surprisingly quickly cured if they perchance have been infected with conjunctivitis, Von Græfe has tried the warm fomentations in some of the cases with good effect. At present, however, his observations have been too few to warrant any very decisive opinion on their efficacy.

III.—Contribution to the treatment of chronic Keratitis.

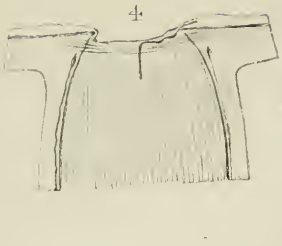
We often see inflammations of the cornea (which appeared originally as circumscribed non-vascular infiltrations, or as vascular, fascicular form inflammations of the cornea) progress favourably up to a certain stage, when their cure is indefinitely retarded by the reappearance of inflammatory swelling in the formerly diseased portions of the cornea.

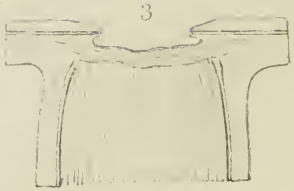
This may be due merely to exposure to deleterious external influences, to the pressure or movements of the lids (the latter cause often impedes the formation of a firm layer of epithelium), or to the recurrent formations of phlyctenulæ on the ocular conjunctiva, or at the edge of the cornea. The best treatment for the latter complication is the strewing-in of finely powdered calomel, or the application of red precipitate ointment.

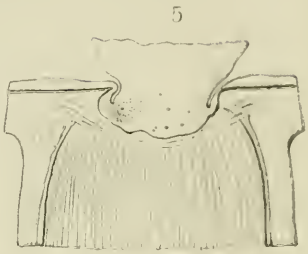
But Von Græfe has found that there is still another and very frequent cause of this recurrence, viz., the inflammatory swelling of a portion of the palpebral conjunctiva. On everting the upper lid in such cases, we find the tarsal portion of the lid but slightly injected; if we, however, cause still greater eversion we see that the conjunctiva between the upper tarsal edge and the cul de sac (uebergangsfalte) is very much swollen, and this is the point from which the conjunctival complication emanates.

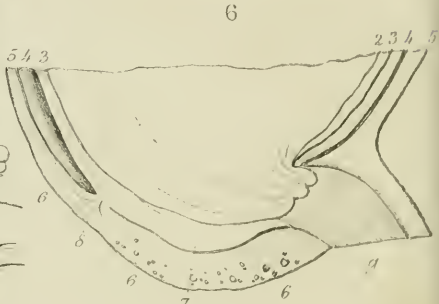
Von Græfe cauterizes this swollen portion of the conjunctiva with a piece of diluted nitrate of silver (after its application we should neutralize it with salt and water), avoiding, however, the tarsal portion of the lid, as this only causes unnecessary irritation. This cauterization acts most beneficially upon the corneal lesions, curing them in a very short time. (It is sometimes necessary to scarify the lids after the cauterization.)

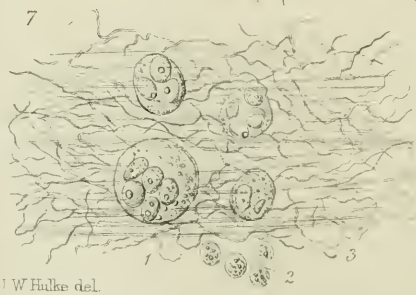
This complication is not unfrequently met with in scrofulous children, who, suffering from fasciculariform keratitis, or chronic vascular corneal infiltrations, have been confined to the room for a length of time.











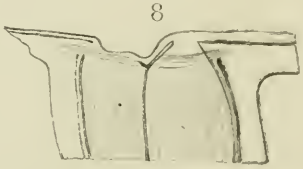


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PLATE XII.

Fig. I. A vertical section through the middle of an excavated optic nerve-entrance, in acute glaucoma. The lamina cribrosa thrust outwards, and the edge of the sclero-choroidal foramen undermined by extension of the excavation in a lateral direction. (Case I, p. 69).

Fig. II. Dilated choroidal capillaries from the same case, their average diameter $\frac{1}{860}''$. A large vein is seen at a deeper level. (Page 69).

Fig. III. A similar section to that represented by Fig. I, from a case of chronic glaucoma, showing the same changes in a less degree. (Case II, p. 70).

Fig. IV. A less excavated optic nerve-entrance, 18 days after the outbreak of acute glaucoma in an eye which had long been blind. (Case III, p. 70).

Fig. V. A very deeply excavated optic nerve-entrance 3 years after the commencement of acute glaucoma. 1. The hyaloid capsule separated from the membrana limitans. (Case IV, p. 72).

Fig. VI. A vertical section through the optic nerve-entrance and posterior staphyloma. 2. Hyaloid capsule of the vitreous humour. 3. Retina. 4. Choroid. 5. Sclerotic. 6. Staphyloma. 7. Enormously thickened retina.* 8. Apparent absence of choroid. 9. Excavated optic nerve-entrance. (Case V, p. 75).

Fig. VII. Hyaloid septum from the vitreous humour. 1. The nuclei (cells) of the hyaloid membrane transformed into colossal blood-cells. 2. Exudation corpuscles set free. 3. Fibres resembling those formed in coagulating fibrine. 4. Wrinkles in the hyaloid membrane. (Case V., p. 77).

Fig. VIII. A vertical section of the optic nerve-entrance in a case of posterior staphyloma. The side towards the staphyloma is the left of the figure. (Case VI, p. 78.)

* The retina, *near to the entrance of the optic nerve*, was not so thick as it is represented in the figure: at this part it was very attenuated.

PLATE XII—*continued.*

Fig. *a, b, c.* Portion of the fibrous covering of the growths, × 33 linear.

a. Dilatations connected with the portion of the fibrous tissue *c*, nearest the growth; they are arranged in parallel rows.

b. Blood-vessel ramifying among the fibrous tissue.

Fig. *a'.* Lateral view of one fibre with the dilatations, × 200.

Fig. *aa.* The above dilatations, × 200.

Fig. *aaa.* Similar dilatations, × 500.

Fig. *f, g, m, p.* Portion of the growth about $\frac{1}{4}$ of a line from the covering fibrous tissue, × 200.

f. Dark grey opaque deposit of lime.

p. Light yellow, translucent deposit.

g. Fibrous tissue.

m. Canaliculi which, from the dilatations, ramify towards the surface of the tumours.

Fig. *f, g, d, d.* Portion from the deeper (porous) part of the growth, × 200.

d, d. Blood-vessels cut transversely.

f. Dilatations filled with deposits of lime, and anastomosing with each other.

g. Fibrous tissue attached to the blood-vessels on one side, and to the dilatations on the other side.

Measurements, with × 200.

Diameter of the fibres on the surface of the growth $= \frac{1}{1340}$ of an inch.

Short diameter of the dilatations immediately underneath the above fibres $= \frac{2}{1300}$ to $\frac{6}{130}$ of an inch.

PLATE 13.

Illustrates Dr. Rainy's paper, page 91.

PLATE XIII, *a.*

"Diagrams in Outline, for Reports of Cases," page 61.

Fig: 1.

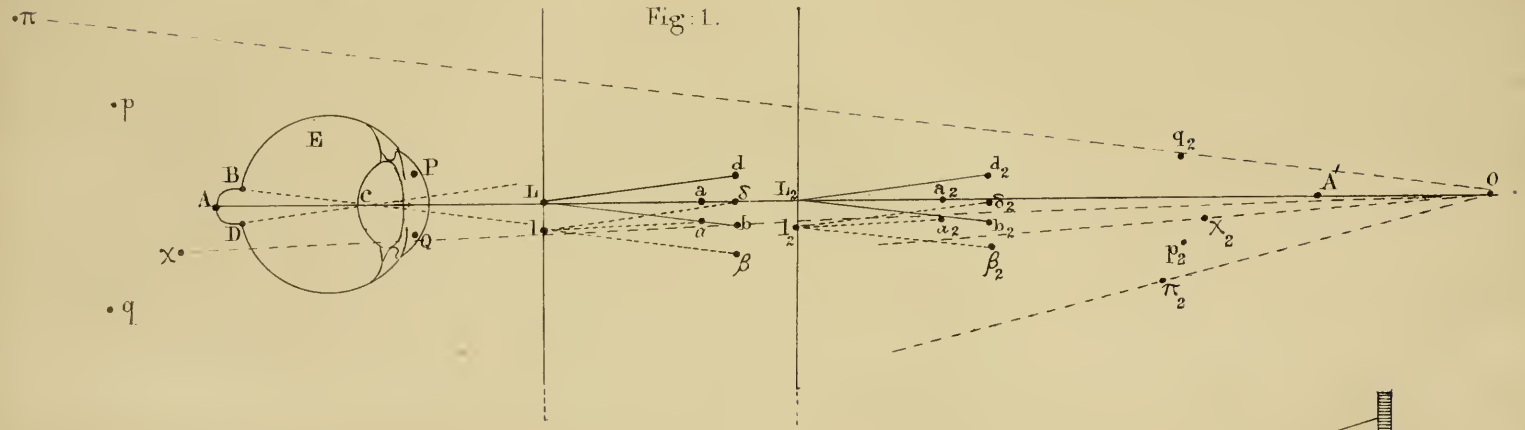
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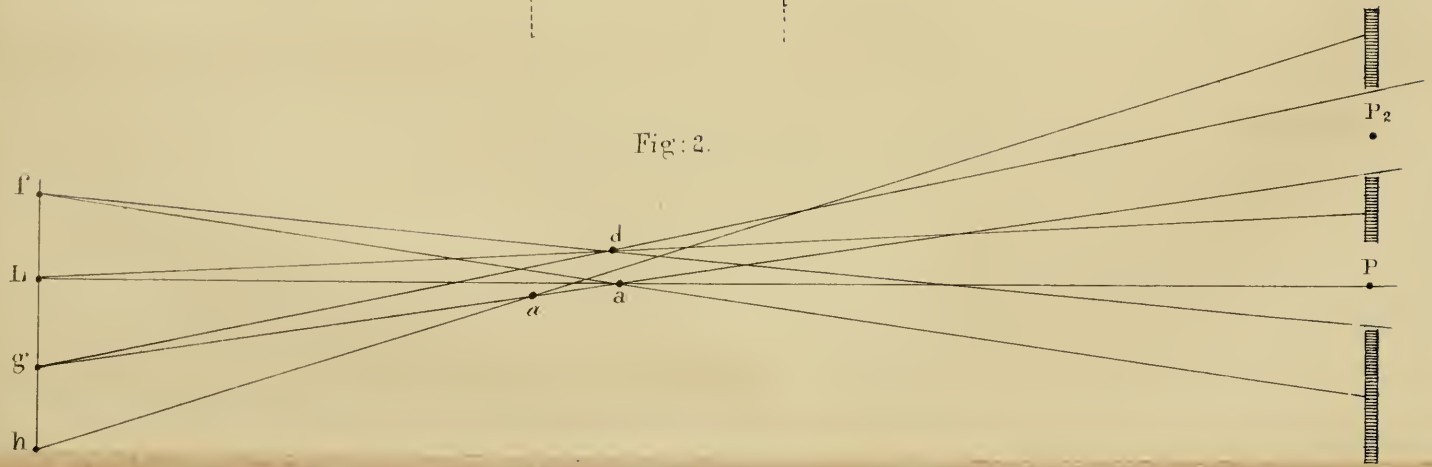
Fig: 2.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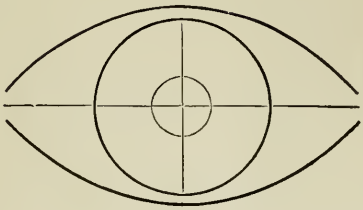

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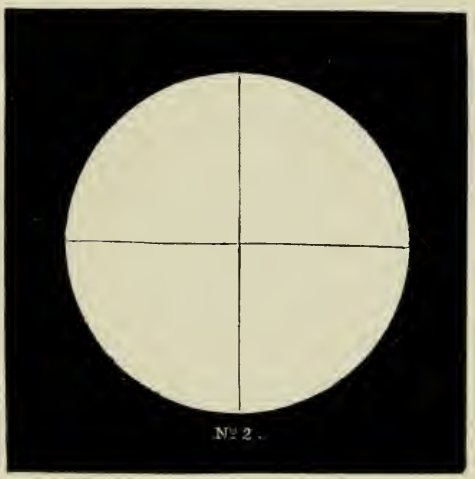

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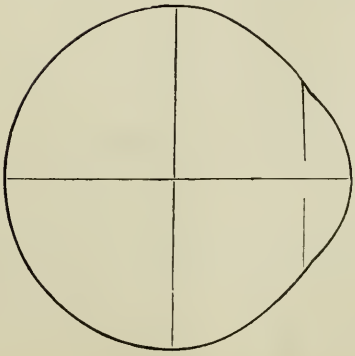

N° 3

The Royal London

Ophthalmic Hospital Reports,

and Journal of

Ophthalmic Medicine and Surgery.

Number 1. (14 *Old Series*). *April* 1861.

NOTICE TO SUBSCRIBERS.

On the 25th of August 1857, the Medical Staff of the Royal London Ophthalmic Hospital proposed to issue a Journal containing an account of the practice of the Institution. It was intended to embrace original communications, selected cases, and monthly reports by the Registrar; to which might be added, contributions of scientific interest, or practical importance, derived from other sources.

The first Number was issued October 1857, and the publication, though not strictly quarterly, has subsequently appeared with regularity sufficient to complete two volumes.

The later numbers, however, have assumed a very different appearance to those which were at first submitted to the profession, and it has therefore been deemed necessary to re-model the Journal: at the same time, as it is the only periodical in England, specially devoted to Ophthalmic Medicine and Surgery, it is thought desirable to extend its limits, by admitting reviews and periscopes, and thus to make it more generally useful.

It will be edited by members of the Staff, and appear under the title "Ophthalmic Hospital Reports, and Journal of Ophthalmic Medicine and Surgery."

Unfortunately the first Number of the New Series is issued under great disadvantages, arising from the short interval which

has elapsed since the decision for the proposed changes,—from the very recent appearance (in March 1861) of the Number *due* October 1860—and from difficulties in consequence of very heavy expenses incurred, in former Numbers, for engravings and coloured lithographs. In future, the amount of illustration will much depend on the support of the professional public, the Medical Officers of the Royal London Ophthalmic Hospital having led the way by devoting their fees, received from pupils, to the interests of the Journal.

The absence of the January Number 1861, will be rectified in July by the publication of a double one; and henceforth the editors hope to maintain a punctual quarterly issue.

All communications should be addressed to the editors, at the Royal London Ophthalmic Hospital, Moorfields, E.C.

Subscribers are requested to transmit their subscriptions for 1861 (viz., six shillings), by Post Office Order, payable at the Post Office, Vigo Street, Regent Street, W., to the Honorary Secretary of the Medical Council, John W. Hulke, instead of to T. J. Dawley as directed in No. 13.

Moorfields, *April* 1*st*. 1861.

Part I.

Original Contributions.

PRACTICAL OBSERVATIONS UPON CONGENITAL CATARACT.

By G. Critchett, F.R.C.S., *Surgeon to the Royal London Ophthalmic Hospital.*

In August 1855, in a lecture that I published in the "Lancet" upon Congenital Cataract, the following remarks occur:—"Congenital cataract deserves very careful notice on account of the numerous aspects it assumes, the frequency with which it is overlooked, the baneful influences it may exert upon the prospects and career of the patients, and the favourable results of suitable treatment. The more we have an opportunity of observing these cases, the more evident does it become that nature revels in variety. Even in her morbid operations, when we fancy we have exhausted every possible form, some new manifestation presents itself." Subsequent observation has fully confirmed the truth of the foregoing remarks.

Since the year 1855, I have kept brief notes of about thirty cases of congenital cataract, observed at different ages, and presenting great varieties. Such varieties would be considered interesting by the pathological observer as a subject of scientific enquiry; but if, as I believe, there attaches to each variety important practical details involving questions of treatment and methods of operating, the interest and importance of the investigation is much enhanced. I propose to group my observations, under the guidance of the cases that have come before my notice, into—

1st. Congenital cataract as we find it in infants.

2ndly. As we find it in children and young adults.

There is this peculiarity that almost invariably attends congenital cataract as observed in infancy—whether it involve the entire lens, or whether it be partial, and

involving the nuclear portion only, viz., that the opacity is dense and plainly visible, this simply arises from the fact that the partial cases met with at a maturer age are overlooked during infancy. Whatever doubt may exist in regard to the propriety of interfering with some adult cases, there can be no question that in all cases of marked congenital cataract in infancy, an operation is indicated; at no period of life are operations so well borne, so safely performed, or so successful as during infancy, and the eye accommodates itself to its altered conditions far better than at a later period. The method of operating may be varied according to circumstances, but each plan seems nearly equally safe. In cases where the entire lens is opaque, it may be removed at once through a linear opening in the cornea, or it may be broken up and gradually absorbed in the aqueous chamber.

In cases coming up a long way out of the country, and where time is an object, linear extraction may be advantageously selected. Some little judgment is required to accomplish this proceeding with the least possible amount of risk, and with the preservation of the natural form and position of the pupil. Where the lens is opaque throughout, this method is readily carried out.

In December 1860, a little boy, æt. 2, with congenital cataract involving the entire lens, was brought up from the country, accompanied by a sister, æt. 18, also suffering from partial congenital cataract, the cataracts were dense and only permitted perception of light. Under chloroform I made linear openings at the outer part of the cornea, to the extent of about two lines and a-half, then carefully, but freely opening the anterior capsule, using caution not to wound the posterior capsule, or enter the vitreous chamber, the cataracts were removed gradually by two or three introductions of a flat silver spoon; on opening the capsule, the nucleus escaped into the anterior chamber, and was removed first, then the cortical portion, leaving clear pupils. Rapid recovery took place with small central pupils, and

with excellent vision, and for days the little fellow was kept in a constant state of excitement in gazing for the first time upon surrounding objects. If the case could have been watched for some months, the same results might have been obtained by the old method of solution, and perhaps as a rule a more perfect result is obtained by this method in regard to the mobility and central position of the pupil; but care is required to renew the operation from time to time until all the lenticular matter is absorbed, and to avoid the formation of a tough opaque capsule within the field of vision. In infants, the lens may be very freely broken up and large portions may escape into the anterior chamber, without setting up any serious reaction or inflammation. I have even known the lens escape from its capsule, and become dislocated into the anterior chamber, and gradually undergo absorption, without producing any unfavourable consequences; this state of things would produce serious inflammation in an adult. In those cases in which the opacity is limited to the nucleus of the lens, some modification of the treatment is necessary; these cases differ in the extent to which the nucleus is involved, and in the degree of density in the opacity—usually in infants the opacity is well marked; these cases may be treated upon the same principles whether they are observed in infancy, in childhood, or in adult age. Previous to entering upon the question of treatment, there are one or two points of some practical interest—one has reference to the mode in which these partial cataracts form, the other has reference to the question whether such partial cataracts undergo any change, whether the transparent and marginal portion of the lens becomes opaque in process of time. As regards the first point, in my lecture before alluded to, the following observations occur:—"It is difficult to account for this sudden arrest of opaque deposit in the lens, so different to anything we meet with in idiopathic cataract; it seems to depend upon some modification of nutrition during fœtal growth, of which the lens constitutes a delicate test. A somewhat curious illustration of

this occurred recently at the Ophthalmic Hospital, under the care of my friend Mr. Bowman, in a boy about twelve years old. In this case it was pointed out by this accurate observer, that the opacity had been deposited in layers; that there was first a central opaque portion about the size of a shot, then a thin layer of transparent material, then a layer of opaque matter, and the remainder of the lens clear. This curious arrangement was quite evident when pointed out, though it would have escaped the notice of an ordinary observer. It was particularly interesting, not merely as a pathological curiosity, but as suggestive of the mode in which these partial opacities occur during fœtal growth, the lens being either transparent or opaque according to the vital force at different periods." These remarks seem to offer suggestions as to the mode in which these partial opacities occur, and explain the almost endless diversities that take place both in their relative size and density. The other point is of yet greater practical interest, respecting which some difference of opinion seems to exist amongst Ophthalmic Surgeons, viz., whether partial cataracts undergo any change after the termination of fœtal life, either by an increase in the density of that portion that is already opaque, or by a gradual extension of the opacity into the marginal and transparent portion. Upon the reply to this question, may depend the propriety of performing an operation, and the selection of the particular form of operation; this will be made more clear and evident when the treatment is under consideration. My own opinion is, that as a rule congenital cataracts do not change after the term of fœtal life. I have met with several such cases in individuals between twenty and thirty years of age, and very recently I was consulted by a gentleman nearly fifty years of age, with a well-marked partial congenital cataract in which the marginal portion of the lens remained perfectly transparent. At the same time, cases no doubt occasionally occur in which congenital opacities of the lens increase in density and in extent. We have now to consider the subject of treatment in partial

congenital cataract, whether it comes before our notice in infancy, in childhood, or in adult age. In infancy, as I have before remarked, the opacity is usually strongly marked and dense, however, it may differ in extent, and if it be of sufficient extent to occupy the pupillary area, when the pupil is in its normal state, it will seriously interfere with vision, and requires some operative proceeding. There are three methods that may be adopted in such cases :—1st, to remove the cataract by solution ; 2ndly, to perform linear extraction ; 3rdly, to make an artificial pupil. The first of these methods is so well understood, and has been so long, and so scientifically practised, as to require no comments here.

The other two methods seem to me to merit some observations.

In the performance of linear extraction for partial congenital cataract, it is desirable that the adhesion of the lens to its capsule be loosened, that the transparent portion of the lens be made opaque, and that the general consistence of the entire lens be reduced, and its substance be rendered more diffluent. The principles upon which this operation may be most safely, quickly, and completely performed, have been carefully worked out and practically illustrated by my friend Mr. Bowman. His method is as follows :—The pupil having been completely dilated by means of a strong solution of atropine, the capsule is freely opened with a fine needle, and the lens is thoroughly broken up by repeated small strokes of the needle in every direction, at the same time the utmost care is taken not to wound the posterior capsule, or enter the vitreous chamber. After this operation, the pupil must be kept well dilated with atropine. The effect of this part of the operation is to render the entire body of the lens opaque, to increase its bulk, and to soften it by dilution with aqueous humour, and to separate it from the capsule. It also sometimes causes a bulging of some parts of the broken lens through its capsule into the anterior chamber, which may be followed by more or less rather severe reaction. After a period varying from three to six

days, and regulated somewhat by the amount of the reaction, and by the change produced in the substance of the lens, a linear opening is made at the margin of the cornea, and with a small spoon, the lenticular matter is gradually removed leaving a clear pupil. Atropine must again be freely employed to keep the pupil well dilated, until all irritation has passed off. If these various steps are carefully and skilfully executed, a very good result is almost invariably obtained. The advantages of the proceeding are, the rapidity with which the cataract is removed, and the avoidance of any of the inconveniences attending gradual solution, such as, considerable delay, slow inflammation, opaque and tough capsule, closure of pupil, &c. The risks attending the operation are, severe pain and reaction, threatening the safety of the eye, and a distorted and adherent pupil. I think it safer to make a tolerably free linear opening, rather than a small one, at the time the extraction is performed. I have certainly seen several cases most successfully treated in this way, and I think that both theoretically and practically the operation seems scarcely capable of any further improvement. I have frequently tested it, and have obtained favourable results, at the same time the impression left on my mind is, that in cases where time is no object, a more perfect result may be obtained, and inflammation may be more completely avoided, by the old method of solution; in this way a small central bright moveable pupil is obtained, securing the utmost amount of vision, that the eye when deprived of its lens is capable of. The third method to which I am anxious to draw attention is by the formation of an artificial pupil. This method is comparatively recent in this country, and its merits can only be determined by further experience; in the meantime it may be useful briefly to sketch the history of the operation up to this time, the cases to which it seems most applicable, the objections to the proceeding, and the advantages it offers as compared with the removal of the lens.

I believe Professor Græfe of Berlin was the first to

make an artificial pupil in cases of congenital cataract, sometimes in combination with linear extraction, and sometimes as a single operation. His method was by iridectomy; I have no details of his operations, but I have reason to believe he was satisfied with the results.

Within the last twelve months, Professor Pagenstecher has performed iriddesis in several cases of partial congenital cataract; he considers this method preferable to iridectomy, and has indicated certain points that he thinks important to be carried out in the performance of this operation. Thus he advises that the opening should be made in the sclerotic, just anterior to the ciliary ligament, so that the natural plane of the iris be preserved; also that a considerable portion of the iris be drawn out and tied, so as to draw the entire pupil near to the margin of the cornea, and thus cover as much as possible of the opaque part of the lens with the iris, and leave a well-defined small moveable pupil opposite to the transparent part of the lens. This plan, he contends, gives the best result optically, and is easily accomplished. I have performed this operation in three cases.

The first in November, 1860, Master B., æt. 8, was brought to me with symptoms of short and defective sight, both for near and distant objects; cannot face the light; puts himself into peculiar attitudes when reading, and in twilight and candlelight seems nearly blind; he reads No. 14 of Jaeger with difficulty; his sight is not much improved by atropine unless No. 16 convex is employed, and by its aid he reads No. 10, he also sees distant objects better when atropine is used. With the opthalmoscope partial congenital cataracts could be distinctly seen, rather more than half the centre of the lens was opaque, the margin being quite transparent. Under chloroform I performed iriddesis downwards and inwards, making the opening in the sclerotic and drawing out as much of the iris as I could through the opening, so as to make the pupil small and near the margin, and therefore opposite the transparent part of the lens, and at the same

time to cover the remainder of the lens as much as possible; this object I accomplished more completely in one eye than the other, no irritation followed, on the second day the silk tie came away, and within a week the eyes were quite recovered. Sight was very much improved both for near and distant objects; could read No. 4 at 7 inches, or at least spell the words at that distance; and a few weeks ago I heard from his mamma to say that she found that her boy could distinguish distant objects as well as her other children, and that he was able to continue his education in a satisfactory manner.

The next case was a young female, æt. 19, who brought her little brother to the Ophthalmic Hospital with congenital cataracts, and whose case I related at the early part of this paper. She was found to be suffering from partial congenital cataracts, in the left eye the opaque lens was partly detached at the lower part and sides, and swung backwards and forwards in the vitreous chamber. The sight was very defective in this eye, there being little more than perception of light, and the ophthalmoscope shewed evidence of changes in the choroid and retina, all of which were probably intra-uterine. The other eye when under the influence of atropine shewed a partial opacity of the lens with a clear margin, which margin seemed broader at the lower part than at the remainder of the circumference; her sight was very imperfect both for near and distant objects, and was not improved by either concave or convex glasses. She could read No. 14 of Jaeger with difficulty at four inches distance, and could perform coarse needle work, but could never thread her needle. Her sight was somewhat improved by the atropine, but not to any great extent. Under chloroform I made an artificial pupil downwards in the same manner as in the last case, the eye rapidly recovered, and before leaving the Hospital the patient could thread an ordinary needle, and read No. 6 of Jaeger at an average distance. The third case was in a little girl, æt. 6, who was first brought to me on January 15, 1861. She was very myopic, and intolerant of a strong

light. She had been taught to read with letters the size of about 18, Jaeger, and could not read 16. Her sight was much improved by atropine. Partial congenital cataracts were distinctly visible, the margin quite clear and appearing to be broadest below. On the 29th of the same month I performed iriddesis downwards in both eyes, and the result was most satisfactory, perhaps rather more so than in either of the two other cases. A fortnight after, this little girl could spell with rapidity the words of No. 4 of Jaeger, and could see distant objects well. The appearance of all these cases, after the operation, was very similar, and under the ophthalmoscope was rather singular. In all these was seen a small active balloon-shaped pupil; about one-third of the greater extremity of the pupil presented the opaque part of the lens, the remainder a perfectly transparent circumference up to the very edge of the lens, beyond which a thin transparent line of illumination was visible; through the extreme boundary of the cornea the fundus was clearly visible. I have been favoured with two other interesting cases of the same kind by my colleagues, Messrs. Bowman and Poland.

Congenital Cataracts.—One treated by Linear Extraction, the other by Iriddesis.

February, 1860. Master W., æt. 15, has been supposed to be shortsighted as long as he can remember; has never been able to distinguish objects at a distance; the defect of sight has increased of late. He is at school, and his studies have been interrupted. If he reads for half an hour, the eyes itch and smart, get red and watery, and he is obliged to desist. He has frequent headaches, attributed to strain of the eyes, which look injected. Lately he has complained of coloured wheels, on reading by gas light. Each lens is obviously opaque, and on dilating the pupils the opacity is seen to occupy only the layers intermediate between the centre and the superficies; at all events, the cortical part is clear. The right has the fainter opacity; the left is more dense, but probably of the same character. The right eye reads No. 3 of Jaeger at 4 inches; the left, No. 14 at 4 inches. Vision is not improved by atropine, though the clear margin is uncovered by it.

Linear extraction was performed the same month on the left eye, as being that which most needed relief, and chiefly with the object of affording more perfect sight of distant objects with the aid of a lens, and for occasional use

in near vision of minute objects, also of course with a suitable lens. This result was well attained: the pupil was central and clear; with a convex glass of 2 inches focus he could read No. 1 of Jaeger, and with a glass of 3 inches could see distant objects much better than with the other eye, or than he had ever done before.

During the summer he returned to school, and was able to work fairly with the right eye. On my explaining, however, that without extracting the cataract of that eye, a considerable improvement of its sight might be expected from a displacement of the pupil, he consented, and I performed iriddesis inwards, by Mr. Critchett's method, on 28th November. Hardly any irritation followed, and four days afterwards he found he could read much better, and at a greater distance. No. 5 of Jaeger was distinguished at 10 instead of at 6 inches, and No. 20 at 10 feet. The pupil acted freely. I had made the puncture at the extreme margin of the chamber, and had drawn out the pupillary edge with a Tyrrells' hook, made of flexible aluminium to facilitate its movement on the nasal side of the globe. The pupil was at first rather narrow; when I saw him after 7 weeks, it was wider and larger, but the improvement of vision continued, and he seldom made use of the convex lens before the left eye, using the right commonly for all purposes.

James P. H., æt. 7.—An intelligent healthy lad was admitted under Mr. Poland's care some short time back with congenital cataract of the left eye. The opacity affected the posterior part of the lens, and this only partially so, thus leaving the nasal side of the lens perfectly transparent. The vision was rendered indistinct, in consequence of the natural relation of the iris overhanging the remaining transparent part, so that the boy could not distinguish ordinary letters or the time by the watch. It was proposed that before attempting any interference with the lens we should place the transparent part of the lens in direct communication with the light, by drawing out the nasal portion of the iris and confining it in that situation by a ligature. This was done, and the boy could tell the figures on the watch, and could distinguish his letters. He has a strabismus in that eye, which will require rectifying.

The advantages of this method, as contrasted with the removal of the cataract in partial congenital cases, seem to be, the extreme simplicity and safety of the operation, the certainty with which the size and position of the artificial pupil can be regulated, and the preservation of the lens, together with the natural focusing power of the eye, rendering unnecessary the use of glasses. In cases also where the opacity is so faint, and the sight so slightly impaired, as scarcely to justify removal of the lens, iriddesis seems to offer a satisfactory compromise. The only objections to the

proceeding that suggest themselves to my mind are, the possibility of the margin of the lens becoming subsequently opaque, thus rendering the operation futile; and again, the transparent margin being in some cases so narrow, that the improvement to vision is very slight. In the event of the former, viz., the supervention of opacity of the margin, it would still be competent to remove the cataract under quite as favourable circumstances, as if an iriddesis had not been performed, and according to some high authorities even more so; and as regards the latter, the success of every proceeding must necessarily depend upon the judicious selection of cases. In young people the power of dispensing with cataract glasses seems to me a great advantage, and after weighing every point, I am drawn to the conclusion, that the application of iriddesis to properly selected cases of congenital cataract, is an improvement in ophthalmic surgery.

(*To be continued.*)

PRACTICAL REMARKS ON SOME OF THE DISEASES OF THE FRONTAL SINUS.

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The frontal sinus when distended, whether by solid growths, as exostoses or polypi, or by collections of fluid, as by pus or mucus, generally encroaches upon the orbit, where it forms a swelling that frequently bears so close a resemblance to a tumour originating in this cavity, that occasionally its real nature is only shown by its ultimate issue, or by an exploratory incision. The implication of the orbit is almost a necessary consequence of the close proximity of the two cavities (the upper and inner part of the roof of the orbit, anteriorly, forming part of the floor of the sinus which is

immediately above), and of the paper-like thinness of the bony party-wall.

Exostoses springing from the walls of the frontal sinuses seem to be very rare. The only one I have seen is the well-known specimen in the Hunterian Museum, which is a bony tumour $2\frac{1}{2}$ inches in diameter, and for the most part of ivory density, filling both sinuses and the upper part of the left orbit, invading the right orbit, and projecting for nearly 1 inch on both surfaces of the skull. A still larger specimen is preserved in the Cambridge University Museum, and a third smaller one in that of St. Bartholomew's Hospital. The two first are of doubtful origin; from their great size and from the general implication of the neighbouring cavities, it cannot now be determined whether they commenced in the frontal or ethmoidal cells. Makenzie mentions two small undoubted specimens in his possession.

The extreme hardness of these bony out-growths, and the tightness with which they are locked in by the cavities in which they have, so to say, moulded themselves, would render their removal by operation very difficult, if not quite impracticable, when they have reached such a size as to be manifest externally by protruding the bony walls; whilst before this has happened, the obscurity of the symptoms would not warrant any operative interference.

Polypi in the frontal sinus, unassociated with similar growths in the nasal fossæ, seem to be of great rarity, and I do not know of any authentic recorded case; whilst in conjunction with nasal polypi they would appear to be not so extremely unfrequent.

Abscess.—Inflammation of the mucous membrane of the frontal sinus ending in the formation of pus occurs in two distinct forms, an acute and a chronic. A feeling of discomfort about the brow, amounting sometimes to pain of a constant, aching character, aggravated when the circulation is quickened, and by firm pressure upon the front of the sinus, is an early symptom, and in some instances, for a long time, the only one. In acute cases the pus makes its way out,

before the sinus has undergone any notable dilatation, by bursting into the nose, or by perforating the roof of the orbit. The extension of the abscess into this cavity is announced by the appearance of a tense, elastic swelling below the inner end of the supra-orbital arch, between the eyebrow and eyeball. This is accompanied with redness and swelling of the upper eyelid, which cannot be completely raised; the upward movement of the eyeball is hindered, and there is diplopia in the upper half of the field of vision. If it be not opened the abscess enlarges, displaces the eyeball downwards and outwards, sometimes projects it, and finally bursts through the upper eyelid, upon which the swelling and redness subside, and a permanent fistula, leading into the frontal sinus, remains. The displacement of the eyeball is greatest in chronic abscess, and where the sinus is slowly distended by the retention of mucus; in such cases the cavity may acquire enormous dimensions before its walls are perforated. The enlargement mainly takes place in the direction in which the sinus is normally developed; the orbital and cerebral plates of the horizontal process of the frontal bone, that form the floor and roof of the sinus, yielding readily to the distending pressure, become widely separated, the former deviates more than the latter, and the orbit is more encroached upon than the cranial cavity. The greater strength of its anterior wall prevents much enlargement of the sinus in this direction, but a careful examination will often show that in the latter stages the nasal eminences are unduly prominent.

When the floor of the sinus bulges into the orbit, and before its continuity is broken, it forms a hard, inelastic swelling, that might easily be mistaken for an exostosis or enchondromatous tumour, springing from the upper or inner orbital wall, were it not for a slight degree of compressibility. Subsequently when the bony shell has partially disappeared, the distended periosteum has all the elasticity of a cyst; and the possibility of a wrong diagnosis is increased by the frequency of dermoid cystic tumours about

the margin of the orbit, which occasionally have bony scales in their walls; these cysts, however, are always congenital. In a case recorded below, the bulging sinus formed a swelling at the inner canthus, crossed by the tendo oculi; which, but for its hardness and incompressibility, was not unlike a distended lachrymal sac.

Abscess of the sinus is, in some cases, distinctly traceable to an injury, a blow, or fall, and so is distension of the sinus by the collection of mucus. In case V. the severity of the accident renders it not improbable that the infundibulum was injured by the fall, and afterwards became obliterated. Frequently no cause is apparent.

Treatment.—Before the appearance of an unusual swelling about the brow or orbit, the cases are so obscure that the treatment can only be expectant; but as soon as their nature has been ascertained, the cavity of the sinus ought to be laid freely open, and a sufficient exit provided for its contents. This exposure of the interior of the sinus, is followed by increased inflammation, but in the cases described below this was never alarming. Syringing the cavity with tepid water should not be omitted, and when the reaction has subsided, benefit will be obtained from astringent injections. A permanently or indefinitely open fistula will, notwithstanding, often be the result.

Case I.—Abscess of the Frontal Sinus.

Mr. E., æt. 36, consulted Mr. Bowman, June 1st, 1853, on account of a pretty constant pain which he had suffered over the left brow for six years, during the last two of which a swelling had existed below the brow, the eyeball had been a little projected, and its upward movement slighly limited, the upper eyelid swollen and somewhat drooped. For six months past pressure upon the eyelids had caused a copious discharge of pus from the left nostril.

An abscess, which could be emptied by pressure, was felt at the roof of the orbit. There was no opening in the skin. Slight diplopia happened in looking upwards. The patient's general appearance was good, and there was no history of syphilis. A course of iodide of potassium was ordered. June 22nd, his condition was unchanged, and an operation was recommended. February 27th, 1854—the appearance of the part is as nearly as possible the same as at the last date, only the deformity is somewhat more. Anything that quickens the circulation causes pain; his sleep is not disturbed. May 29.—Last week

he had giddiness which lasted 3 or 4 hours. He is now anxious for an operation. The swelling is greater, but the part is not otherwise altered, June 5th.—Chloroform having been administered, an incision about 1¼ inches long was made into the swelling, just under the supra-orbital arch, and ʒii of fœtid pus were let out. The finger introduced into the wound entered the frontal sinus, which was so much dilated that, though buried up to the first joint, the finger did not reach the limits of the cavity. The horizontal measurement of the dilated sinus was found with a probe to be about 2 inches, and the vertical 1½ inches. There was not the least indication of the anterior wall of the sinus being unhealthy, but its orbital wall was absorbed, and here the pus had made its way as an abscess, the edge of which presented forwards under the supra-orbital arch, beneath the orbicularis palp. After washing out the sinus with a syringe, it was felt to be lined with a velvety mucous membrane. A probe could not be passed into the nose, nor did any blood escape by the nostril. The sinus was enlarged cerebrad as well as towards the orbit. No bad symptoms followed the exposure of the cavity of the sinus, but a copious purulent discharge continued during several months. May, 1855.—The discharge is much reduced in quantity, has lost its purulent character, and is now only mucous. The external wound has contracted, and the cavity is much reduced in size. The eyelid opens better, and there is no pain or distress. November 29, 1859.—Still further improvement has taken place. A small permanent fistulous opening remains, but this is so much under cover of the brow that it causes no disfigurement. The sinus is syringed out morning and evening, and occasionally a weak astringent lotion is used.

Case II.—Abscess of the Frontal Sinus following a blow.

October 15, 1859, a lady, æt. 30, consulted Mr. Bowman. Six months previously she had accidentally received a blow from the handle of a broom, which fell against her left brow and grazed the skin of her nose. This soon got well, but more or less discomfort occasionally recurred about the brow, and for two months past there had been an occasional transient swelling of the upper lid, but none of the eye or brow. Two days previously an elastic fluctuating swelling, accompanied by more acute inflammation and pain had made its appearance below the eyebrow. The lid was tumid. The swelling was opened by a horizontal incision below the brow which gave exit to ʒss of brown bloody pus. Bare bone was detected, and through an orifice ¼ inch in diameter, a probe could be passed 1 inch into the frontal sinus. A small drainage tube was introduced, but this was removed in the evening on the accession of a slight rigor, and tenderness of the part, and more swelling of the lid.

The progress of this case has been marked by occasional accessions of pain, generally coincident with temporary interruptions of the purulent discharge from the sinus.

A year after the abscess was first opened, Mr. Bowman finding the discharge continue in a chronic form enlarged the wound, and gouged away portions of the bone forming the orbital wall of the sinus, hoping thus to remove what might be carious, and at least to enlarge the outlet. For a

while considerable amendment followed this proceeding, but even to this present time some pus escapes daily from a small orifice below the brow, and astringent injections have had no influence in arresting it. No carious bone can be felt, and the matter appears to proceed from the sinus.

There has never been any discharge from the nostril. For about two months some anxiety was felt as to the inflammation extending to the opposite sinus, as some tenderness was experienced below the right brow; this, however, subsided. Vague pains still linger in the frontal region, and even other parts of the head, and the cure seems indefinitely postponed.

*Case III.—Abscess of the Frontal Sinus pointing below the upper margin of the Orbit.**

Ed. S., æt. 23, a strong and healthy soldier of the 2nd Battalion, Coldstream Guards, was admitted into the Regimental Hospital, January 26th, 1860, with a tumour above the left upper eyelid; he had first noticed this six weeks previously, and could not assign any reason for it. It was a prominent, tense, firm elastic swelling, but with an undefined base, projecting from beneath the supra-orbital arch, and apparently stretching backwards above the eyeball along the roof of the orbit.

Five days after the patient's admission into the Hospital, the tumour was exposed by an incision below the eyebrow, parallel to the orbital margin, and punctured, upon which a quantity of glairy muco-purulent fluid escaped from a cavity which was an abscess communicating through the roof of the orbit, with the frontal sinus into which a probe could be passed for a considerable distance from the external wound. The orbital surface of the bone was bare and rough. After the operation the eyelid was red and swollen for a few days. February 22nd.—The swelling had disappeared, and the wound discharged a thin glairy mucus. This discharge, in gradually diminishing quantity, continued during sixteen weeks, when it ceased on the wound closing. At the present time, fourteen months after the operation, there is a scar, about 1½ inches long, below the eyebrow, and very slight ptosis of the eyelid. The opening has completely closed.

Case IV.—Expansion of the Frontal Sinus by the accumulation of mucus.

Maria M., æt. 20, came to the Carey Street Dispensary, March 3rd, 1859, with a tumour at the upper and nasal side of the right orbit, which protruded the eyelid, and displaced the eyeball downwards and outwards. The tumour was about the size of a marble, resisting and elastic. Continuous with its upper border there was a slight irregularity of the supra-orbital ridge, internal to the notch, and the superciliary eminence was more prominent than on the other side. She complained of slight aching pain and tenderness on pressure. There had been great epiphora formerly. The sight of the eye was good. She could not assign any cause for the origin of

* For the account of this case I am indebted to J. Wyatt, Esq., Surgeon to the Coldstream Guards.

the disease. A puncture which was, at this time, made with a grooved needle through the eyelid gave exit to blood only, and a week afterwards the tumour was observed to have very slightly decreased in size. After this it appeared to remain stationary during several months. In October, Mr. Wood made an incision through the upper eyelid parallel with the upper border of the orbit. A free puncture into the tumour gave vent to some inspissated mucus, and it became apparent that the case was one of dilatation of the frontal sinus, the bony wall of which, where it contributes to form the orbital roof, had been absorbed so that the lining membrane of the sinus distended with thick, jelly-like, sticky mucus protruded. About a table spoonful of this inspissated mucus, partly yellowish and opaque, partly transparent, escaped through the puncture with some impulse. A probe could not be passed into the nose. Moderate inflammation followed the operation. A small drainage-tube was used to favour the escape of the pus, and the cavity was syringed out. The wound contracted leaving a small orifice $\frac{1}{8}$ inch in diameter, which for a long time discharged a small quantity of muco-pus.*

Case V.—Expansion of the Frontal Sinus by the accumulation of Mucus.

A. H., æt. 17, a well-grown girl, of healthy appearance, but subject to headache, was sent to me February 15, 1859, on account of protrusion of her right eyeball. It projected $\frac{1}{2}$ an inch in advance of the left, and was displaced slightly outwards ; its movements were free, and in harmony with those of the left globe. Vision slightly presbyopic, but the smallest type could be read. There was no diplopia.

The displacement of the globe was caused by an oblong tumour at the nasal side of the orbit. In size and outline it resembled a filbert, and was slightly grooved by the tendo oculi which was stretched across its middle. It had a bony firmness, and its nasal border was continuous with the nasal process of the upper maxilla and internal angular process of the frontal bone. The skin slid freely over the tumour, and there were no signs of inflammation. Above this hard prominent part of the tumour, between it and the eyeball, a deeper, rounded, elastic portion could be felt by making firm pressure.

The girl's mother, a very intelligent woman, said that her daughter, when five years' old, fell from a window and received a cut over the right eyebrow. Her forehead was much bruised and swollen, and she had concussion of the brain, but the surgeon who attended the child said that there was no fracture. This accident was followed by wry-neck which lasted several months. Two years afterwards a small swelling at the inner side of the eye was first noticed; it did not increase much till puberty, since which it had become much larger. The mother herself had had a tumour, probably a

* The particulars of this case were kindly furnished me by Mr. John Wood, Surgeon to the Dispensary. I saw the girl a few months ago amongst my out-patients, at King's College Hospital. A few drops of mucus flowed daily from the almost capillary opening.

dermoid cyst, removed from the same situation as that in her daughter. The absence of epiphora, and of any traces of inflammation, together with the bony hardness of the prominent part of the tumour, were against the supposition of a dilated lachrymal sac, or a dermoid cyst. The uncertainty of the diagnosis was obviously removeable only by an exploration. An incision was made over the tumour, following the curve of the orbital margin, and the skin was turned aside. In detaching the soft tissues the point of the knife pricked through a bony shell, from the interior of which a small quantity of glairy fluid welled out. This opening was enlarged with a bone forceps and gouge, and about ʒiss of transparent viscid mucus were evacuated from a cavity which proved to be the greatly dilated frontal sinus. A probe could be passed horizontally across into the left sinus for 1½ inches, upwards for the same distance, and backwards for a considerable extent along the nasal side of the orbit. The mucus membrane lining the sinus was smooth, and had a natural appearance. There was no diseased bone. The probe could not be passed into the nose. The wound was left open, and a light poultice was applied. Moderate inflammation ensued; the discharge from the sinus became muco-purulent, and the eyelids and parts around the wound were red and swollen on the following day. After the subsidence of the swelling, which lasted only a few days, I observed for the first time that which, had I not previously overlooked it, might have given me a clue to the real nature of the case, I mean an undue fulness of the anterior wall of the right frontal sinus, so slight indeed that it had previously escaped my notice, though sufficiently appreciable when attention was once drawn to it. The purulent character and the quantity of the discharge diminished slowly. About the end of the following month only a few drops of thin mucus escaped morning and evening from the small fistula which the wound had then become. The orbital wall of the dilated sinus in the course of several months fell in slightly, and there has been a corresponding return of the eye to its original position. At the present time (Feb. 1861) the right is still slightly in advance of the other eye; the orifice of the sinus has become almost capillary, and only occasionally discharges a few drops of thin clear mucus. Some enlargement of the upper part of the nasal process of the superior maxillary and internal angular process of the frontal bones remains.

Part II.

Reviews.

CONGENITAL DISEASES AND MALFORMATIONS OF THE DIOPTRIC MEDIA.

By W. R. Wilde, M.D.

Dublin Quarterly Journal, No. LXI, February, 1861.

We are glad to find that Dr. Wilde has again taken up the subject of malformations of the eye and its appendages, in continuation of his last contribution to Vol. VI of the same journal.

The author, in the present communication, takes the dioptric media, and, commencing with the aqueous humour, notices the rarity both of the increase in quantity, and of the congenital deficiency of this fluid.

The lens, with its capsule, is next adverted to: and here Dr. Wilde offers some remarks on its formation and development. He also alludes to the experiments made on animals by those anatomists who have sought to prove the reproduction of the lens after its having been broken up, and appends the following remarks:—"I think I am warranted in asserting that we require satisfactory evidence as to the reproduction of the lens in whole, or in part, in man under any circumstances. Those who have had much experience in operating, know full well that, owing to the cortical substance of the lens being softer than the nucleus, especially towards its circumference, a portion of it often remains within the capsule, even after the operation of extraction. Unless anatomists are also experienced operators, their mode of treating the eye in the lower animals for the purpose of these experiments may, I think, with justice be questioned by those who well know the great difficulties which surround this branch of practical surgery."

The author next treats of the absence of the lens, of double lenses, of abnormal curvatures of the anterior and posterior part of the capsule of the lens, and of malformations of the lens, quoting Dixon's cases from this Journal. He then proceeds to entozoa within the capsule, congenital synechia posterior, considered as the effect of an intra-uterine iritis, and concludes the

paper with congenital cataracts. These latter are described as being capsular, lenticular, or capsulo-lenticular, partial or complete, of fluid or normal existence, single or double.

The lenticular are divided into complete, partial and central, and posterior lenticular cataracts; "in all these forms," Dr. Wilde remarks, "I have never seen, nor have I read, of a well-authenticated instance of congenital opacity of the lens, or its capsule, increasing in after life. They thus differ from all other forms of cataract, either lenticular or capsular, except that which is the result of ophthalmia neonatorum."

The capsular variety, which is not the result of infantile ophthalmia, is described as a small white speck in the centre of the capsule, presenting almost invariably a very regular, circular form, with a sharp, well-defined edge; the spot being always of a dull flake white, but essentially surrounded by a greyish white border, evidently of thinner material; this annulus is often so very narrow, as to be only observable with a good glass.

Another form of this kind is noticed, viz., where a large central opacity of the capsule projects beyond the general curve of the lens, through the pupil into the anterior chamber, hence termed pyramidal. This, Dr. Wilde says, is always conical, with a circular base, and presents a chalk white appearance, and he quotes Dr. Wilson's case published in the Dub. Hosp. Gazette for Dec., 1860, vol. vi, p. 372.

A third variety—the capsulo-lenticular cataract—is then fully detailed.

The above article is freely supplied with woodcuts; but, as the author himself observes, it would have been better if well executed coloured drawings had been substituted for some of these illustrations.

ON INTRA-OCULAR MYOTOMY IN MYOPIA.

By Mr. Vose Solomon.

In several of the recent numbers of the "Medical Times and Gazette," Mr. Solomon advocates and enforces by cases the division of the ciliary muscle in myopic conditions of the eye, in order to remove this defect. We are well aware that division of the ciliary muscle has had numerous supporters in cases of glaucoma, supposed glaucoma, and mistaken glaucoma, but we were not prepared to find an extension of this operation to defective accommodation of the visual apparatus.

We may, at some future time, review the propriety of intra-ocular myotomy in all its bearings; but for the present we shall

confine ourselves to the points at issue. Is this operation warrantable and justifiable in myopic eyes? Are we to run the risk of damaging an eye by an operation which, even in the hands of the best operators, has caused serious accidents and has destroyed vision, in order to remedy a defect which may be rectified by proper medicinal and dietetic measures, and by careful and judicious selection of appropriate glasses? We will, however, offer for perusal an abstract of the cases in which Mr. Vose Solomon has performed this operation, and thus allow our readers to use their own judgment in the matter. We will offer no comment, but allow them to tell their own tale.

Case 1.—A man, æt. 20, short-sighted from childhood, with impaired vision. For the last 4 years the eyes have been exposed to the glare and intense heat of iron in a state of fusion, since which the myopia has increased, and congestion of the choroid and retina has resulted. There is nothing remarkable in the appearances of the eyes; he reads ½ inch type at 4 inches distance, but cannot make out small pica leaded at any distance; large and distant objects are misty. Intra-ocular myotomy performed; a large escape of aqueous humour ensued, and also prolapse of the iris in each eye; so that a permanent, though slight, distortion of the pupil has resulted. Some improvement followed; but 6 months afterwards impaired vision manifested itself in the left eye, which, after a time, affected also the right.

Case 2.—A boy, æt. 11, short-sighted for 7 years. The eyes are natural distinct vision of small pica at 6 inches, and of the features at 12 yards.

Intra-ocular myotomy performed through the sclerotic. A fortnight after, he reads with ease small pica at 43 inches distance, and recognizes features at 36 yards. The unoperated eye, which used to be the best, is now nearly as good as the other. A slight strabismus convergens affected the left eye for 6 or 8 weeks after the operation, attended apparently with retinal irritation. It subsided spontaneously; and at the end of 7 months, the patient's accommodation was normal.

Case 3.—Girl, æt. 8. Short-sighted for twelve months; the corneæ are much arched: concave glasses afforded the usual relief. She reads small pica at 4 inches, and recognizes her father at 20 yards.

Iridodesis performed on the right, and intro-ocular myotomy on the left eye, which latter was the worst of the two. In the course of a month, the right eye, which used to be the stronger, was soon fatigued by reading, and the accommodation not quite so great as in the other eye. In one month after this, she is reported to recognize her brother at 70 yards.

Case 4.—Girl, æt. 12. Amblyopic myopia; the right eye is the worst. No kind of spectacles give relief. Reads minimum type at 5 inches, and recognizes features not further than across the street. Cannot see to thread a needle or sew. Intra-ocular myotomy on right eye. Six weeks after, could see to thread a needle and sew, and was able to read minimum type at 12 inches with either eye, although she could not sew or thread a needle with the left. This latter was now subject to intra-ocular myotomy, and with the same result as in the other eye.

Case 5.—Man, æt. 45. Short-sighted from childhood; has been in the habit of using No. 16 double concave glasses. Without glasses he reads small pica with the page almost touching his nose. Intra-ocular myotomy. The reading distance was not increased more than 1 inch, but the adjustment for distant objects and features was augmented from 3 to 27 yards.

Case 6.—A girl, æt. 7, read brevier type with distinctness at 5 inches, and recognizes features at 5 yards. The eyes are clear, and of medium size; the corneæ are not conical nor unduly prominent. Pupils active, not dilated.

Intra-ocular myotomy in both eyes. Prolapsus iridis occurred in the left eye, and remained permanent. 3 months after, she could read small pica at 18 inches, and with the left at 13 inches.

Case 7.—A man, æt. 62. Central opacity in both corneæ; myopia of right eye only, the range of the left being normal. He reads small pica No. 1, leaded, at 10 inches; but he cannot recognize persons across the street, unless he is very well acquainted with them. Intra-ocular myotomy. The chamber filled with blood, which was evacuated. No reaction followed. On the 10th day can recognize the features of persons with whom he is familiar 4 or 5 yards further off. No improvement since this time.

Case 8.—A young lady, æt. 15. Vision good up to 4 years ago, when she had an attack of typhoid fever, which left the accommodation of her eyes defective. She could distinguish features at 3 yards, and read minion type with comfort at 18 inches. The eyes are blue, and moderately full in all their dimensions. The movements of the pupils and their diameters are normal. Intra-ocular myotomy in the right eye. Three weeks after, she could distinguish features at 9 yards. An improvement took place in the power of adjustment of the left eye, so that the eyes of another person could be distinctly seen by it at 4 yards. Intra-ocular myotomy was now performed in this left eye; and about 1 month after, she could distinguish features at 25 yards.

Case 10.—Boy, æt. 11. Suffered from asthenopia (weak sight), attended with constant aching of the globes, and has been under treatment 4 months without relief. He could read 40 verses of the New Testament before fatigue ensued. Intra-ocular myotomy performed on right eye; the ciliary muscle being divided at right angles to the rim of the cornea. This was attended by removal of the pain and strengthening of the eye. A similar operation was performed on the left eye. He had no bad symptoms.

The eyes grew stronger, and he could read an hour, and perhaps longer, if he tried. He had no pain in the eyes, unless he read very small type.

Case 11.—Female. Suffered from asthenopia since childhood. Her eyes became weak, dim, and subject to severe aching pains after reading for 20 minutes, and requiring a rest of 10 minutes before she could see the print. Left ciliary muscle cut asunder; the wound bled freely. One month after, she could read with comfort for ½ an hour, and in a subsequent month for 3 or 4 hours without inconvenience.

Cases 9, 12, 13, 14, 15, 16, and 17, do not strictly come under the present class of cases of defective vision; and we have, therefore, omitted any notice of them.

In conclusion, all we can say is, that we should like to have had an accurate detail of the ophthalmoscopic signs, and a more complete and scientific account of the measurements of the accommodation powers in the cases adduced; so that we might have formed a just idea of the necessity for the operation. We must, however, express our satisfaction that the operator has escaped doing as much damage as we could only reasonably have anticipated from his proceeding.

DIE AUSLÖFFELUNG DES STAARS. EIN NEUES VERFAHREN.

Von Dr. Med. Adolf Schuft. *Berlin*, 1860.

The out-scooping of Cataract. A new proceeding.

The practice of removing lenticular cataract through a small opening in the cornea, appears to have originated with Benjamin Gibson, of Manchester; who, dissatisfied with the slowness of the treatment by solution, in many cases, and desirous to avoid the repeated use of the needle, which frequently provoked irritation and even inflammation of the iris, sought for a more rapid and safer cure. He lacerated the anterior capsule very extensively, freely divided the lenticular substance in order to expose it thoroughly to the solvent action of the aqueous humour, and, after a few days, when it had become flocculent and had lost its cohesiveness, he evacuated it through a puncture with a knife near the border of the cornea. Such lenticular matter as was not swept out by the gush of aqueous humour which attended the withdrawal of the knife, was removed with a curette.

The writings of Barton, Hunt, and Walker, show that this operation was largely practised in the Manchester Eye Infirmary, and chiefly in traumatic cases. It was afterwards adopted by Travers, but with such important alterations, that its character was entirely changed. At first, after tearing the capsule, he displaced the lens through the pupil into the anterior chamber, whence he extracted it through a small incision in the cornea; but he subsequently relinquished this proceeding for another, in which he made $\frac{1}{4}$ section of the cornea, then dipped the point of the knife into the pupil previously dilated with belladonna, tore the capsule freely and evacuated the substance of the lens.

Both Gibson's and Travers' operations fell into disrepute, partly owing to certain imperfections in the details, and partly from the neglect of a precise definition of the particular cases in which they were applicable.

After having remained in disuse during many years, Gibson's operation was re-introduced at the Royal London Ophthalmic Hospital in 1851, by Mr. Bowman, and about the same time but independently, by Dr. A. v. Græfe into German practice, with such important improvements, as give it from that date an established position.

In congenital cataract, in traumatic cataract, occurring in young persons, and in other cases where the whole lens has become softened, Gibson's operation of "extraction through a small opening," or "linear extraction," as it has been termed by

the German school, with the recent improvements and precautions, left little to be desired; but it could not be followed where there is a hard nucleus, because this is incapable of being got away through the limited corneal wound.

The removal of a moderately firm, but not hard nucleus, though it may be in some cases accomplished successfully, occasionally provokes an injurious degree of irritation and inflammation, that much detracts from the completeness of the recovery.

The bruising of the iris in using the curette, and the irritation of this highly sensitive organ, by the pressure exerted on it by portions of nucleus which may have been left behind, and which, when bathed by the aqueous humour, rapidly swell, seem to be factors in producing the inflammation. Dr. A. v. Græfe sought to lessen or remove their deleterious action, by immediately preceding the linear extraction with an iridectomy; for the extraction of a nucleus of moderate size, even when more or less hard, is much facilitated by the artificial enlargement of the pupil; whilst by the excision of that part of the iris which lies nearest to the wound in the cornea, and which is therefore most exposed to injury from the curette, the common starting point of an iritis is removed; the intrinsic antiphlogistic action of iridectomy has also its own value. Græfe divides his proceeding into the following four acts:—1. An incision exactly in the boundary of the cornea, at its temporal side embracing $\frac{1}{4}$ of its circumference. 2. Excision of the iris as in iridectomy, but to a smaller extent than the corneal wound, making only a narrow coloboma iridis. 3. Opening the capsule which must be torn in the whole length of the combined natural and artificial pupils. 4. The insertion of a scoop, which is broader, shallower, and sharper, at its extremity than Daviel's, between the posterior capsule and the nucleus of the lens; and finally, the lifting away of the latter. In this proceeding it is essential that the cortical portion of the cataract be soft and pulpy; that the nucleus be neither too large nor too hard; and that the capsule be freely torn up to the very edge of the lens. If the cortical portion be cohesive and the capsule be opened less extensively, the edge of the scoop will not glide between the posterior capsule and the nucleus, and there will be great danger of rupturing the hyaloid fossa and of dislocating the lens.

The wider application which Dr. A. v. Græfe gave to "linear extraction," by combining iridectomy with it, has quite recently been still further extended by Dr. Schuft, one of his assistants, who has contrived a new form of scoop, with which he says even the hardest lenses may be surely and safely got away. Comparing the details of the ordinary operation of extraction with those of the double operation, he endeavours to prove that the latter is free from many of the necessary dangers and unavoidable accidents occasionally attendant on the former.

He particularly instances the greater disposition of the lesser wound in linear extraction, to unite, in consequence of its smaller extent, even if it be much contused; the great facility which the division of the sphincter pupillæ, and the cleft in the iris, afford to the ready and complete removal of the lens, lessening the chances of iritis, and of prolapse of the iris with uneven adjustment of the wound; and the advantage of being able to fix the eyeball throughout the operation, till its completion. Dr. Schuft's scoops (he uses a diminishing series of four), differ in several important particulars from the old fashioned long, narrow curette of Daviel. Being made of silver, its stem is so flexible that it can be bent at a convenient angle to suit particular cases. Its chief features are, the great breadth of the scoop, its flattened bottom, from which its thin margin springs abruptly, and forms a gently rising curve from the stem to the free extremity of the scoop where it reaches its maximum; and its narrow stem which springs directly from the scoop, without any intermediate neck. Its breadth gives such support, that the cataract can be lifted into the anterior chamber, either entire or in greatest part. Its thin margin bites so firmly into the back of the hard lens, as to fix it completely. Its projecting cup-like lip presses after the cataract in the withdrawal of this latter. The difference in the sizes of the scoop and its stem, obviates gaping of the corneal wound, whilst the former is within the eye.

"With this scoop," says Schuft, "every lens, whether transparent, partially or entirely opaque, or of whatever consistence, may be completely removed from the eye through a linear wound, without inordinate injury or risk."

The following is the description of his proceeding:—

1st act.—An assistant holds the lids of the patient who is on his back. The operator fixes the eyeball with a forceps, and pushes a broad lance-knife with straight edges through the temporal side of the cornea close to its margin; thrusting the knife onwards parallel to the iris, and enlarging the wound slightly in withdrawing it, an incision is made of at most 3″ extent.

2nd act.—An iris forceps is introduced closed, then opened, the pupillary margin of the iris is seized, drawn outside the wound, and the protruding piece is cut off.

3rd act.—The capsule is opened (this is best done with Græfe's fleam-cystotom) from the inner border of the pupil, to the exposed equator of the lens.

4th act.—The scoop (either No. 1 or 3 according to the size of the nucleus), introduced into the wound, is at first inclined considerably towards the centre of the eyeball, until the extremity has passed round the projected equator of the lens; the handle is then depressed, the scoop being simultaneously pushed onwards, as if with the idea of shelling the lens out of the hyaloid fossa. When the centre of the scoop has reached the

posterior pole of the lens, all that it contains within its broad surface, is lifted with a gentle leverage into the anterior chamber. The manipulation should mainly take the direction of the corneal wound, which is obtained by slightly drawing back the instrument, and in this way the inner surface of the iris is spared as much as possible. By this manœuvre, the scoop and its edge are so pressed into the nucleus, that this can be drawn out gently sweeping the cornea. Only with very large and hard nuclei is it ever necessary to press the scoop in more firmly, by pressing the cataract forwards against the cornea. After taking away the nucleus, the lids should be gently rubbed upon the cornea, in order to bring any cortical portions of the lens which may have been left, into the pupilary area, whence they are to be removed with No. 2 or 4 scoop, horizontally introduced.

In order to prevent a loss of the vitreous humour, the wound should not be made in the sclerotic, as in iridectomy for the relief of tension, but ought to lie a short distance within the corneal margin; and as a consequence of this the iris is not excised up to its extreme circumference, but a small belt is left standing. Schuft considers "this double operation superior to all others, and the only one indicated in the following cases:—

"All cataracts in persons above 25 to 30 years old.—1. Those having a hard nucleus, of greater or smaller size. 2. Those which are not perfectly ripe. Further in old or in young persons. 3. In cataracta accreta. 4. In cases of bodies, which lie within the lens, beyond the limits of the dilated pupil. 5. Exceptionally where the quick removal of a normal lens is desired (as in the case of a cysticercus)."

He would dissuade from the ordinary extraction through a large section (which for brevity may be termed *flap* extraction), believing this may now be dispensed with, for the safer proceeding so warmly advocated by him.

By comparing Schuft's with Dr. A. v. Græfe's proceeding it will be evident that there is but little dissimilarity between them: in all essential points they agree, the one being only a slight elaboration of the other. What is peculiarly Schuft's, is the broad, flat-bottomed, thin-edged scoop, which has enabled him to give the operation a very wide application.

The objections commonly raised are, the greater injury inflicted by the double operation; the deformity of the pupil and the defective vision likely to be produced by this; the liability to dislocation of the lens, to rupture of the hyaloid fossa, and loss of the vitreous humour. The first of these will be found upon consideration less real than at first sight appears. The corneal wound by reason of its smaller extent, is in itself better disposed to quick union, than that in flap extraction, and the union cannot be prevented by prolapse of the iris, a fertile source of much trouble; whilst the history of iridectomy shows that the excision of a portion of the iris, is a really powerful, local, antiphlogistic

measure. The gap in the iris is certainly a deformity; but if narrow, it is so inconspicuous as hardly to attract attention, whilst its alleged bad influence on vision is unproved. If the wound be kept well inside the corneal margin, loss of vitreous humour will be extremely rare, whilst the omission of this precaution will occasion it.

Sufficiently numerous data are yet wanting for a full comparison of Schuft's method, with flap extraction. It is certain that it can never wholly supersede flap extraction. From the results however already obtained in the Royal London Ophthalmic Hospital,* we infer, that it will probably prove a very valuable measure in certain cases; particularly in badly nourished persons, and those of advanced age, whose tissues are atrophied, and in whom the cornea is prone to suppurate; where there is cough, and where prominence of the eyeball, and absence of self-control dispose to an escape of vitreous humour.

Part III.

Periscope.

CONTRIBUTIONS TO THE KNOWLEDGE OF THE ANOMALIES OF REFRACTION AND ACCOMMODATION. BY F. C. DONDERS—Archiv. für Ophth. Vol. vi. Part I.

By Mr. J. Soelberg Wells.

I have given in a former paper† an abstract of Donders' article on the selection of spectacles, which forms, in fact, almost the key-stone of his theory of accommodation, etc. Since the publication of that article he has been indefatigable in investigating the subject still more, particularly with regard to the anomalies of refraction, the relative range of accommodation, etc., and as these investigations are of great interest and value, I purpose giving a resumé of them in this and the next number of the Reports.

I. *Definition and Classification of the Anomalies of Refraction.*—It has been before pointed out how we can calculate the range of accommodation if we know the nearest and furthest point.‡

* These shall be given in a subsequent number.
† Ophthalmic Hospital Report, vol. iii, p. 107.
‡ Ophthalmic Hospital Report, vol. iii, p. 110.

In an ideal eye the furthest point should lie at an infinite distance, *i. e.*, the eye, when accommodating for its furthest point, should bring parallel rays to a focus just on the bacillar layer of the retina.

But few eyes, however, come up to this ideal.

Donders classifies the anomalies of accommodation according to the furthest point of distinct vision, and distinguishes three categories.

1. *Normal* or *emmetropic* eyes, in which parallel rays are brought to a focus on the retina.

2. *Myopic* or *brachymetropic* eyes, which are adjusted for divergent rays. In this case parallel rays are, even when the eye accommodates itself for its furthest point, brought to a focus before the retina; so that distinct images are formed on the retina only of those objects, the rays from which impinge divergently upon the retina.

3. *Hypermetropic* eyes, adjusted for convergent rays. In this case parallel rays are brought to a focus *behind* the retina.

In a state of rest the focal point of the dioptric system is situated in myopia, *anterior* to, in hypermetropia *posterior* to, the bacillar layer of the retina.

II. *Myopia.*—Donders points out the fact that slight degrees of myopia are far more common than is generally supposed. Many persons who fancy that they see perfectly at a distance, are astonished to find that they are myopic, seeing better with the $\frac{1}{60}$ or $\frac{1}{40}$. This class of patients was formerly not classified with myopic. For observers were puzzled with those cases in which a person could see distinctly at a distance of 2, 3, or 4 feet, and yet could not distinguish letters an inch in height at a distance of 15—20 feet. These were, in fact, cases of slight myopia, of $\frac{1}{24}$, $\frac{1}{36}$, $\frac{1}{48}$, in which the far point was situated 24″, 36″, 48″ from the eye. At a distance of 15 feet the circles of dispersion are then already considerable, particularly if the pupil is tolerably dilated.

Von Græfe has, however, observed a peculiar "myopia in distans" which appears to be due to a spasmodic action of the ciliary muscle.

III. *Hypermetropia.*—Donders proposes that the term hypermetropia should be adopted instead of hyperpresbyopia or hyperopia, as being one which really expresses the nature of the affection. The latter has been but little studied hitherto, and the erroneous opinions which have prevailed concerning it, have, as he points out, not been without evil consequences; for convex glasses have been but too unconditionally rejected for distant vision, and for near objects the weakest convex glasses with which the patient could manage to see (that is by dint of great straining) were given.

We may call an eye hypermetropic when it sees beyond the normally serviceable standard, when it is able to accommodate for convergent rays, when in fact the focus of the dioptric system lies *behind* the retina. As rays generally emanate divergently from objects, or at most parallel, viz., when the object is at an infinite distance, the eye has no occasion to accommodate itself for convergent rays. It answers all purposes if it can unite tolerably divergent rays on the retina, and if it can, besides this, relax itself sufficiently to accommodate for parallel rays. If it can relax itself so far as to bring even convergent rays to a focus on the retina, it possesses, so to say, a useless power, and has, besides this, lost much in point of utility, it is hypermetropic.

How the degree of hypermetropia is to be found has been before stated.*

Donders has frequently experienced some difficulty in determining the degree of hypermetropia with exactitude. For instance, hypermetropic patients who could at first see best at a distance with perhaps $\frac{1}{12}$, soon preferred $\frac{1}{10}$, and finally perhaps even $\frac{1}{8}$. He thinks this is due to the fact that these persons having been always obliged to strain their accommodation, even when looking at distant objects, continue to do so when the necessity for it is abolished, when we give them convex glasses. We consequently, for this reason, find that the degree of hypermetropia determined in the above manner is always too low. Of the truth of this we can easily convince ourselves by paralysing the power of accommodation through the instillation of atropine. When the power of accommodation is thus annulled, there is only one point of distinct vision, and this is placed as far from the eye as the original furthest point of distinct vision; according to Donders it is even a little more distant; this, however, varies very much.

The difference brought about by atropine in normal or myopic eyes is generally but very slight. The former become very slightly hypermetropic, so that they see a very small luminous point† more distinctly with glasses of $\frac{1}{80}$, $\frac{1}{60}$, but seldom with $\frac{1}{50}$ or $\frac{1}{40}$. Myopic eyes for the most part see distinctly at a distance with but a slightly weaker concave glass than they generally require.

But in hypermetropic eyes on the contrary the difference before and after mydriasis is often very great. Donders has seen cases in which in order to see distinctly glasses of $\frac{1}{24}$, $\frac{1}{20}$, were at first required, afterwards perhaps $\frac{1}{16}$ or $\frac{7}{12}$, but after artificial mydriasis they require $\frac{1}{6}$ in order to see distinctly at a distance. The necessity of straining the power of accommodation to the

* Ophthalmic Hospital Report, vol. iii, p. 121.

† This is the best object for determining the boundaries of the power of accommodation.

utmost in order to see distinctly has become habitual. Such great differences are, however, only met with in young persons who possess a great power of accommodation. For at a more advanced age, and in young hypermetropic patients enjoying but a limited range of accommodation, the difference before and after artificial mydriasis is far less.

IV. *Asthenopia (Hebetudo visus).* The symptoms of this affection are very characteristic.

"The appearance of the eye is quite normal; its movements are unimpaired; the convergence of the optic lines presents no difficulty; vision is generally very good, and yet in spite of all this the eye is soon fatigued by reading, writing, or working at near objects. The latter become indistinct and confused, and a sensation of tension, particularly above the eye, soon makes itself felt, so that the person is obliged to rest and cease working. After a few moments he again sees distinctly, but the same symptoms soon reappear even more rapidly than before. The longer the rest the longer can he again continue his work."

This state has received many different names and explanations. According to Donders the cause is to be sought for in the hypermetropic formation of the eye, but the exciting cause is the continued use of the eyes for near objects. The asthenopia is not the fatigue itself, but rather the want of power, on account of which the fatigue occurs. Donders illustrates this thus,—If a person in climbing a hill is soon exhausted, the exertion may indeed be the proximate cause of the fatigue, but its real cause is undoubtedly due to the slight working power of his muscles in proportion to the weight of his body. Now, although this incongruity always exists, even when he is not ascending mountains, and may even be partially reduced by practice, the fatigue shows itself only after repeated excessive exertion without the requisite pauses.

Donders had before pointed out that asthenopia was often due to hypermetropia, he now goes further, and says that hypermetropia is hardly ever absent where asthenopia is observed.*

After the instillation of atropine the hypermetropia soon becomes evident. In order to paralyze the power of accommodation completely, the strength of the solution must be one part of atropine to 120 or 140 of water; for although a solution of one part to 2,000 parts of water will dilate the pupil completely, it does not suffice to paralyze the accommodation.

V. *Relative Range of Accommodation.*—It has been long demonstrated that there is no absolute connection between the state of accommodation of the eye, and the convergence of the optic lines; for there may be differences in the accommodation during

* Except in cases of insufficiency of the internal recti muscles of the eye.

the same degree of convergence and *vice versâ*. After Donders had determined the range of accommodation in general, he thought it important to deduce the relative range of accommodation, during every degree of convergence, from the boundaries of accommodation occurring during this convergence. The influence of the convergence on the furthest and nearest point was found to differ greatly, the reason for this, however, remained doubtful until Donders found that it was due to the conformation of the eye itself; the accommodation, during different convergence of the optic lines, has quite peculiar boundaries (dependent on practice) in the emmetropic, hypermetropic, and myopic eye.

In explanation of this interesting subject Donders has given several plates with full explanations, to which I would especially refer the reader, as my space does not permit me to enter upon this subject, which in order to be thoroughly understood would have to be given *in extenso*.

VI. *Convergent Squint dependent on Hypermetropia.*—If negative glasses are placed before normal eyes, the desire of converging the optic lines too strongly in order to see distinctly often arises, and periodic squinting is consequently called up. This frequently happens when one eye is covered. The same thing occurs in hypermetropia, the only wonder is that all hypermetropic persons do not suffer from it. The one eye is in the meanwhile sacrificed in order that the patient may be able to see the object more distinctly under a greater convergence.

This anomaly has been described as periodic squinting. The squint at first only shows itself when the eye fixes, often only when looking at near objects, in time, however, it becomes habitual, particularly in persons who are always looking at near objects, in reading, writing, etc. Donders thinks now that the greater number of convergent squints are caused by hypermetropia. In the last eighteen cases which he has examined, hypermetropia was present in sixteen, generally of $\frac{1}{36}$, to $\frac{1}{12}$, never in a very high degree.

VII. *The relation of Presbyopia to Asthenopia.*—It must at the first glance appear surprising that commencing presbyopia does not lead as often to asthenopia as hypermetropia.

Donders has found that presbyopia is only accompanied by the characteristic signs of asthenopia, when there is at the same time a slight amount of hypermetropia. This calls up symptoms of asthenopia when the total range of accommodation becomes less. Whereas presbyopia *per se* does not do so.

"The asthenopia namely depends upon the fact that distinct vision not only at a distance of 6″, 8″, 10″, but even at 12″, 16″, and 20″, aye even at an infinite distance, is only possible by means of great straining of the power of accommodation. If hypermetropic patients do not experience any difficulty when

looking at far objects, it is due to the fact that there is no occasion to see distinctly at a distance for any length of time. On the other hand at the commencement of presbyopia in the normal eye, distinct vision at 7″ distance is a matter of impossibility, but it is easy enough at 12″ or 16″, and at a greater distance the weakest convex glass acts already disadvantageously. The hypermetropic eye is on the contrary but little favoured by the object being removed a few inches further from the eye; whereas the presbyopic eye is by this means freed from every exertion. The former is obliged to give up work, the latter can continue it without any difficulty if the visual angle at a distance of 16″ is not too small. The presbyopic eye only seeing (even at the commencement of the exertion) distinctly at a greater distance, the want of spectacles, which would render vision at a shorter distance possible, is evident. The hypermetropic eye can, on the other hand, see at first very distinctly at a short distance, and on this account the want of spectacles which would facilitate vision at *every* distance, has often been overlooked."

VIII. *The nature of the fatigue in Asthenopia.*—The symptoms of asthenopia are only due to the fatigue of the muscular apparatus of the accommodation. Donders has described two kinds of fatigue in his researches on the elasticity of muscles.

1st. The fatigue which results from the work done by the muscle. This work consists in the movement of a burden, consisting of the body or any portion of the body which is to be moved, or even in an object external to the body.

2nd. That fatigue, which results from the continued extension of a muscle in a state of contraction. This arises when a burden is only held tight without being moved. When the arm, for instance, is bent horizontally in the elbow joint, and a weight is then suspended from the hand.

The arm and the weight remain in the same position and yet fatigue soon results.

To which form does the fatigue in asthenopia belong?

It depends upon the continued extension of a contracted muscle. "This extension is consequent upon the resistance of the organs concerned in accommodation, when their form and position has to undergo a change. By means of their elasticity they reassume their former form and position, as soon as the contraction of the muscular apparatus of the accommodation (Brücke's muscle) ceases. In order to effect continued accommodation, this muscle must be in a permanent state of contraction. This permanent contraction creates fatigue, and the fatigue increases (as mentioned above), the extensibility; by virtue of this law the contraction must be always on the increase, in order that the muscle may retain the same shortness, and may uninterruptedly generate the same effect."

But sooner or later this fatigue passes over into exhaustion,

particularly in the amount of contraction necessary in hypermetropia. In this way the symptoms of asthenopia are easily explained, without the necessity of calling upon the conditions of the retina, the pressure of intraocular fluids, or impediments in the circulation, etc., for an explanation.

IX.—*Upon the choice of Spectacles and their effect.*—"It is not in the least my intention to treat at any length the choice of spectacles, and the influence of their use upon the eye. I cannot, however, abstain from giving a few hints, which find their origin in what I have stated previously as to the relative territory of accommodation in myopic and hypermetropic persons, the more so as I did not, when formerly giving instructions as to the choice and use of spectacles,* sufficiently consider the relative territory of accommodation."

"I formerly laid it down as a rule that we could generally furnish myopic persons (whose eyes are otherwise healthy) with spectacles, with which they can see distinctly at an infinite distance. These are consequently glasses which neutralize the myopia completely. But we not unfrequently find that they are unable to see with these spectacles for any length of time at distances of 8″, 12″, or 16″, without experiencing fatigue. This cannot now surprise us any more. For we have learned above that myopic persons are not in the habit of bringing into action a portion of their power of accommodation proportionate to the convergence; they have practised rather to let their power of accommodation rest during convergence. With the said glasses they must now all at once bring into action $\frac{1}{8}$, $\frac{1}{12}$, $\frac{1}{16}$, for the said distances. They are consequently forced into an exertion which corresponds to that of normal eyes at similar degrees of convergence. Many are not able to do this. Only young eyes with a great A. and a slight degree of myopia can accomplish this undisturbedly. In others, asthenopia with all its peculiar symptoms shows itself, and dissatisfied they soon lay the spectacles aside; and with them we must commence, for near objects at least, with weaker glasses. If no real diminution of it exists, we may at a later period go over to the continued use of quite neutralizing glasses. For the weak glasses exert a peculiar influence. During their use already a more than common exertion of the accommodative apparatus is required than before (the convergence remaining the same), and the consequence of this is that the relative territory of accommodation is even after a short time already considerably changed. The younger the eye is, which wears these weak glasses, the more easily is this change of locality brought about. In after years we then find that the relative territory of accommodation of these myopic persons is nearly similar to that of normal eyes.

* Archiv. vol. iv, pt. 1. (Ophthalmic Hospital Report, vol. iii, 107).

The spectacle glass has, so to say, become an integrate part of the dioptric system, and convergence as well as accommodation have developed themselves in harmony with this. This is the condition most to be desired for myopic eyes, and the progress of the myopia is by this means, in my opinion, far more checked than accelerated. The cases in which we cannot attain this end are, however, numerous. When persons are somewhat advanced in age, when the power of accommodation is but limited, when there is amblyopia (which is almost of necessity the case in the higher degrees of myopia), and in general in the highest degrees of myopia, in which the neutralizing glasses are so strong that the retinal images are much diminished in size, one and the same pair of spectacles will never serve for the distinct vision of near and distant objects. I have from time to time also met with cases in which the myopia existed in a greater degree in the optic axis than in the lateral portions of the retina. I remember, for instance, a case in which the retina could be distinctly seen in the optic axis in the erect image with a glass of $-\frac{1}{4}$, but in the direction of the æquator but with $-\frac{1}{6}$. Now if we, in such cases, neutralize the myopia in the optic axis, we make the indirect vision hypermetropic, and this is certainly not desirable. Weaker glasses should therefore be preferred. By the removal of the relative territory of accommodation through the use of concave glasses, the furthest point of distinct vision of myopic persons is brought nearer the eye. Hence the myopia has apparently increased, but this is not the case in reality. For we find on examination that the same concave glasses still render them capable of seeing distinctly at a distance. These myopic persons have only been forced to let their power of accommodation act more than before, during the convergence necessary for vision with both eyes; and these are the conditions upon which near objects can be seen without any particular exertion with neutralizing glasses. This is not accompanied by any further disadvantage. But the use of too strong concave glasses makes myopic persons hypermetropic. They acquire the habit of letting their power of accommodation act even when their optic lines are parallel, and they are soon unable to relax it completely. For the same reason they do not now, as formerly, see distinctly at a distance with glasses which were before perfectly neutralizing. Fortunately this continued exertion soon disappears again (if it has not taken root too deeply) when weaker glasses are used, and is at once annulled through artificial mydriasis. Still more easily may normal eyes be rendered myopic in a few days through the use of weak concave glasses; such a myopia does not however depend upon the conformation of the eye, but upon the continued action of the apparatus of accommodation, and consequently easily disappears again.

"The deviation of the relative territory of accommodation in

hypermetropic persons is, with regard to the emmetropic eye, just the reverse of that in myopic patients. And for this reason just the reverse obtains (as to the use of neutralizing glasses) for hypermetropic patients, of that which was recommended for myopic persons; in the latter the neutralizing glasses require at first too much from the power of accommodation, in the former on the contrary too little. If we give hypermetropic patients spectacles which nearly neutralize the degree (of hypermetropia) determined during the state of mydriasis, they at first not only see indistinctly with them at a distance, but even for near objects young persons much prefer a weaker glass. The reason is evident enough. They have been too much accustomed to exert nearly the whole energy of their power of accommodation during a convergence for 10″ or 12″, to be now able at once to limit their accommodation to $\frac{1}{10}$ or $\frac{1}{12}$.

Their territory of accommodation must be gradually transposed, and this is brought about by the use, at first, of weaker glasses for near and distant vision. There is no doubt that it is desirable that hypermetropic patients should gradually accustom themselves to the use of quite neutralizing glasses. For only when they have attained this, are they permanently ensured against the symptoms of asthenopia. It has been thought that the use of spectacles in asthenopia might be rendered superfluous by a gradual diminution in the strength of the glasses. From the above it must, however, be evident that my endeavour is just opposed to this, for I try to accustom them to stronger glasses, to such at least which are sufficiently strong to render every exertion in looking at a distant object unnecessary."

Part IV.

Minor Contributions, etc.

CASE OF REMARKABLE BLOOD EFFUSION INTO THE LAMELLATED CORNEA, FOLLOWING A WOUND.

REPORTED BY

Mr. J. Soelberg Wells,

Clinical Assistant to Mr. Bowman.

Mary Ann Rilf, æt. 43, was admitted an out-patient at the Royal London Ophthalmic Hospital on the 29th of January, 1861, under Mr. Bowman. She had struck her right eye about sixteen weeks previously with a carpet needle, and wounded the cornea. On her admission, the eye was found to be very painful, much injected and exceedingly irritable; in the centre of the cornea

(just over the area of the pupil) a very peculiar, round, bright red spot was observed, abruptly raised about $\frac{1}{10}$ of an inch above the surface, and about $\frac{1}{8}$ of an inch in diameter. It appeared to be an infiltration of blood into the lamellated substance of the cornea, and to be covered by the epithelium. Two or three vessels could be seen (but only with a lens) running towards it from the lower edge of the cornea. The aqueous humour was clear, the iris natural, the pupil free, but completely hidden by the red spot, except on a side view. Vision was of course much impaired, the patient only counting fingers with difficulty at six inches distance, and if held out of the axis. The irritation, as well as the dimension of the spot increasing, notwithstanding the depleting and soothing treatment adopted, Mr. Bowman determined on February 5th to perform iridectomy, with the double object of, 1st, diminishing the irritable condition of the eye; and 2ndly, of bringing the pupil opposite a transparent portion of the cornea, (it appearing certain that a central leucoma would at all events be left, supposing the blood effusion to be cured). The iridectomy was made outwards, under chloroform, and Mr. Bowman at the same time gently removed with a knife a portion of the blood spot; in doing this it was found to be of a red spongy texture, apparently occupying all but the deepest layers of the lamellated tissue. When the coagulum was removed the exposed surface bled from several points. The mass removed was found, upon microscopical examination by Dr. Bader, to consist of blood corpuscles entangled in corneal tissue.

The effect of the operation upon the irritability of the eye was most marked, for within a few days after, all pain and irritation had subsided, and the part was level with the rest of the surface.

March 12.—The eye is free from all pain and irritation, the spot on the cornea is circumscribed, and of a cloudy grey colour, the rest of the cornea being quite normal. The patient reads No. 16 Jager fluently, and the sight is improving.

IRIDECTOMY IN IRITIC AND CHOROIDAL INFLAMMATION, AND IN CERTAIN FORMS OF CORNEITIS.

By Mr. Hulke.

It is commonly thought by persons, who only occasionally see cases of eye-disease, that the practice of iridectomy is advocated in the treatment of glaucoma only. Notwithstanding the translation of Von Græfe's admirable Memoirs on Iridectomy in Chronic Iritis and Irido-choroiditis, by the New Sydenham Society, in 1859, there are at the present time many who are still not aware that this operation is very efficient in these forms of iritic and

choroidal inflammation, and many who have never heard of its great value in certain most desperate conditions of the cornea. It has therefore appeared to me, that the publication of a few selected cases would be very useful.

Case I.—Iridectomy in Irido-choroiditis.

James F., æt. 34, an artizan, who had never had syphilis or rheumatism, was admitted into the Royal London Ophthalmic Hospital, Dec. 21, 1859, with chronic-inflammation of the iris and choroid: this was the fifth attack; the first having occurred six years before. Both eyes were similarly affected. The pupil of the right was irregular and very small (its greatest diameter was about $\frac{1}{2}$ a line); excepting a small portion above, its margin everywhere adhered to the capsule of the lens, and its area was obstructed by a greyish membrane, vision was reduced to a dim perception of large objects, as a finger, held close to the eye. The globe was hard. I did an iridectomy at the temporal side. Three days after this the hardness of the globe was less, and he distinguished a finger at ten inches distance. January 20, 1860, he read No. 15; the globe had a natural tension. One week after this date he read No. 8, with ease, and spelled No. 6 with some hesitation. February 3, he read No. 4.

Case II.—Iridectomy in Irido-choroiditis.

Eliza H., æt. 35, was taken into the Royal London Ophthalmic Hospital, May 1, 1860, on account of irido-choroidal inflammation of the right eye, of four months' duration; the globe was hard, the sclerotic congested, and the conjunctiva slightly chemosed. The pupil was small, irregular, everywhere fixed to the lens, and obstructed by a greyish membrane. Quantitative perception of light* alone was present. I performed an iridectomy at the temporal side, the same day. 8th. The conjunctival chemosis had disappeared, and the sclerotic congestion was much less. 15th. The tension of the globe had become natural, and No. 16 was read. June 13. No. 10 could be read. 20th. The optic nerve-entrance, which had been previously hidden by the cloudy state of the vitreous humour, could be seen. August 10. The external congestion of the eye-ball had disappeared, and the general aspect of the eye was much improved. No. 6 read with ease. February 15, 1861. The eye continued well. The inflammation has never recurred since the operation.

Case III.—Iridectomy in chronic Irido—choroiditis.

Clara H., æt. 16, came under my care at the Royal London Ophthalmic Hospital February 7, 1860, suffering with irido-choroiditis and keratitis of both eyes; it was the sixth attack, the first having occurred when she was two years old. The surfaces of the cornea were slightly uneven, and sprinkled with faint nebulæ. The ciliary region was congested, and in each eye the periphery of the cornea was vascular. Both pupils were small and irregular: the right was completely adherent to the lens, but in the left there was a small free part of the border, upwards and towards the temporal side, which was dilated to a very slight extent, about $\frac{1}{6}$ of a line, by atropine, and both were partially blocked with very thin adventitious membranes. The vision of the right was much more impaired than that of the left eye; the right could read No. 18 "Test Type," the left No. 12, easily, and No. 10 slowly and with hesitation.

February 28. An iridectomy was done, at the temporal side, in each eye. March 2. She was made an out-patient, no inflammation had occurred; there

* The distinction between light and darkness, as opposed to the perception of objects which is expressed by the term qualitative perception of light.

was merely a slight redness immediately around the wounds. Vision continued as before the operation. 27th. The congestion had disappeared; with the left eye No. 4 was read, and with the right No. 18. June 19. The general appearance of the eyes much improved since the last date; the left read No. 2, and the right No. 18; the sight of this continued as before.

The ultimate issue of cases of this kind, under the ordinary recognized modes of treatment, is known to be unfavourable. Each fresh inflammatory attack leaves the eye more injured than before, until sight is destroyed. The treatment by mercury, iodide of potassium, by local abstraction of blood, and counter-irritation has, without doubt, a certain value whilst inflammation is present; but in spite of it, relapses often happen, and it does not prevent subsequent attacks. Often cases are first seen when the pupil is already closed by organized inflammatory membrane so that the question is not —whether an artificial pupil is necessary, but when, at what time, is this best made? It will commonly be replied—to operate on an inflamed eye must aggravate and increase the already existing inflammation, and make matters worse than before; it is therefore better to wait for the complete subsidence of vascular excitement, before undertaking any operation. Now, although it must be conceded that this is a sound opinion when it concerns some of the old methods of forming an artificial pupil, it is undoubtedly an erroneous one respecting the action of iridectomy, for experience daily shows that this operation may not only be performed in chronic-iritis and irido-choroiditis, whilst excitement is present, with perfect impunity, but generally with great benefit. It at once checks the inflammatory process, establishes a sufficient pupil, and in a large proportion of cases ensures freedom from future attacks. Thus it does all that the most judicious medical treatment can effect, and much more. Whilst advocating the superior practice of iridectomy in these diseases, I must add that I do not mean to inculcate the rejection of medical treatment, but I regard this, in many cases and in certain stages, as an auxiliary measure, rather than as one of primary importance.

The value of the operation in cases where perforation of the cornea by deep and extensive ulceration is imminent, is well shown by the next two cases; whilst the third is a very remarkable example of its beneficial action where perforation had taken place, and the formation of a corneal fistula threatened the complete loss of the eye. Iridectomy at once placed the inflamed structure in a state of complete repose, and afforded an opportunity for repair whilst at the same time it provided a good artificial pupil, which would be required for the restoration of vision, in consequence of the closure of the natural one, or its concealment by the necessary corneal opacity.

Case IV.—Acute inflammation of the cornea and iris caused by a corrosive fluid. Iridectomy.

John D., æt 49, employed in gas works, was splashed in the right eye by some ammoniacal liquor. He applied at the Royal London Ophthalmic Hospital September 4th, a few days after the accident, with acute inflammation, and great irritability of the eye. The cornea was opaque; these were two small, circumscribed, dot-like abscesses amongst its layers, and its surface was excoriated and uneven. He was wholly unable to recognize any objects, and was suffering intense pain. October 12th. The irritability of the eye had increased. The cornea was extensively ulcerated and threatened to give way. November 2nd. The two small, dot-like abscesses had coalesced, and a large onyx was present. The lower part of the anterior chamber was filled with yellowish lymph. He was much worn by pain, and had slept but little for many nights. Iridectomy was recommended, but declined. November 20th. His condition was nearly the same, but he was willing to undergo the operation. I therefore made a large iridectomy at the nasal

side of the cornea where there was a small, even, and less opaque portion. 23rd. Great improvement had already occurred. The irritability and congestion of the eye had greatly diminished. He said "I have not been so easy for two months; I now sleep well." 27th. The improvement continued. 30th. The cornea was rapidly clearing, the ulcer cicatrizing, he had a good pupil, and already a good recognition of large objects.

Case V.—Keratitis. Extensive onyx. Iritis with closed pupil. Iridectomy.

Daniel D., æt 40, who had been nearly starved during the severe frost, was taken into the Royal London Ophthalmic Hospital with threatening sloughing of the cornea, an extensive central onyx and hypopion. The pupil could not be dilated by atropine; its exact condition was masked by the opacity of the cornea. I made a large iridectomy upwards and outwards. This was immediately followed by improvement; the hypopion soon disappeared, the cornea was saved from sloughing, and the onyx cicatrized: six weeks afterwards the cornea had become quite transparent, except at its centre, where the onyx had left a sharply-defined white scar, concealing the area of the natural pupil which was occupied by a pigmented, adventitious membrane. The artificial pupil was quite clear, and the poor fellow had excellent sight.

Case VI.—Perforating ulcer of the cornea, fistula with incontinence of the aqueous humour. Iridectomy.

A nearly starved, worn-out, old farm labourer, with shrivelled skin and cold blue hands, was sent to me December 8th, 1860, at the Royal London Ophthalmic Hospital Five weeks previously a deep central ulcer had formed on the corner of the right eye, which was perforated by it a fortnight afterwards. I found an aperture, about half a line in diameter, in the very centre of the cornea, imperfectly plugged by a bead of protruding iris, and giving constant escape to the aqueous humour. There was not the smallest anterior chamber, but the iris was directly applied to the back of the cornea. The globe was very soft. There was only a quantitative perception of light, and he suffered constant aching pain. A layer iridectomy was made at the temporal side of the cornea. It required delicate manœuvering to guide the lance knife between the cornea and iris, without wounding the latter, but this was safely accomplished. Three days afterwards the condition of the eye had much improved. There was a good anterior chamber. The protruding bead of iris was shrinking, and there was a good pupil. January 1st, he returned to the country. The tension of the globe was natural. The opacity of the cornea was fast disappearing, and he could distinguish between my fingers when spread, and when closed at a distance of nine inches.

In this remarkable case the free drainage through the corneal incision diverted the aqueous humour during a few hours from the fistula, and gave this an opportunity of closing.

A CATALOGUE OF THE OPHTHALMOSCOPIC DRAWINGS IN THE LIBRARY OF THE ROYAL LONDON OPHTHALMIC HOSPITAL, MOORFIELDS.

In order to facilitate reference, these drawings have been arranged in groups. The following abbreviations have been employed:—o.n. for optic nerve, n.f. for neighbouring fundus, r. for right, l. for left, and fg. for figure.

I propose in some of the future Numbers of this Journal to

give a short description of these drawings and an explanation of the ophthalmoscopic appearances. This explanation must in many cases be but theoretical; in others it is based on dissections.

March, 1861. C. Bader, *Curator*.

Group I.—*The Healthy Human Eye.*

Plate I.—The right (fg. 1), and the left (fg. 2), optic nerve with the neighbouring fundus of a person with brown eyes, fg. 3. The r. o.n. and n.f. of a person with black eyes.

Plate II.—Fg. 1. The region of the yellow spot of a black eye. Fg. 2. The region of the yellow spot of a brown eye. Fg. 3. The region of the yellow spot of a blue eye.

Plate III.—Fgs. 1, 2, and 3, represent views of a healthy brown eye after removal from the body. Fg. 1. The o.n. and n.f. Fg. 2. The region of the yellow spot. Fg. 3. A view of an equatorial portion of the fundus.

Group II.—*Congenital abnormalities.*

Plate I.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f. of an Albino.

Plate II.—Fg. 1. The r. o.n. and n.f. of an Albino. Fg. 2. A view of an equatorial portion of the fundus of the same eye.

Plate III.—Fg. 1. The l. o.n. and n.f. The yellowish-white, opaque band which extends from one side of the o.n. to some distance from the retina, is believed to be an opaque portion of the o.n. fibres.

Plate IV.—Fgs. 1 and 2 are views of the o.n. and n.f. of a colobomatous eye.

Group III.—*Injuries.*

Plate I.—Fg. 1. The o.n. and n.f. of the r. eye, with opaque shreds floating in the vitreous space, close to the retina. Displacement of a large portion of retina. Part of the displaced retina has almost retained its transparency, and part has become white and opaque. Fg. 2. Another view of the displaced retina of the same eye. Fg. 3. A view of the fundus, near the equator of the same eye. Fg. 4. The o.n. and n.f. of the l. eye.

Plate II.—Fg. 1. The r. and fg. 2, the l. o.n. and n.f. The lower half of the retina is displaced; it appears grey and opaque. Fg. 3. An equatorial view of the fundus of the l. eye.

Plate III.—Fg. 1. The o.n. and n.f. of the r. eye. The choroid which surrounds the choroidal aperture is extensively atrophied. The concentric blue opaque lines in the o.n. on a level with the choroidal aperture are probably caused by the injury.

GROUP IV.—*Inflammatory changes and various degenerations of the vitreous humour and of the parts which compose the fundus of the eye.*

Plate I.—Fg. 1. Inflammation of choroid and retina implicating the o.n. l. eye. Fg. 2. Views of the same six months later. Fg. 3. The o.n. and n.f. of the r. eye.

Plate II.—Circumscribed inflammation of choroid and retina in the region of the yellow spot r. eye. Fg. 1. The o.n. and n.f. of the r. eye. Fg. 2. The region of the yellow spot of the r. eye. Fg. 3. The o.n. and n.f. of the l. eye.

Plate III.—Fg. 1 and 2. Enlarged duplicates of plate 2, Fgs. 1 and 2.

Plate IV.—Fg. 1. Circumscribed inflammation of choroid and retina in a later stage.

Plate V.—Fg. 1. The o.n. and n.f. of an eye suffering from extensive ædema of the choroid and retina, with commencing choro-retinitis. Implication of the o.n.

Plate VI.—Fg. 1. The l. o.n. and n.f. Œdema (?) of the choroid; atrophy of the o.n.

Plate VII.—Fgs. 1 and 2. Sequelæ of circumscribed sclero-choro-retinitis, near the o.n. and at the region of the yellow spot. Fg. 1. The o.n. and n.f. of the r. eye. Fg. 2. The region of the yellow spot of the r. eye. Fg. 3. The o.n. and n.f. of the l. eye.

Plate VIII.—Fgs. 1 and 2. Duplicates of Plate VII, fgs. 1 and 2.

Plate IX.—Fgs. 1 and 2. A morbid deposit, perhaps of bone or of fibrous tissue, in the region of the yellow spot, of the r. (fg. 1) and of the l. eye (fg. 2).

Plate X.—Fg. 1. The o.n. and n.f. Sequelæ of circumscribed choro-retinitis with development of white fibrous tissue in the vitreous space near the o.n.

GROUP V.—*Rupture of retinal and choroidal blood vessels.*

Plate I.—Fg. 1. The region of the y.s. of the l. eye, occupied by a large clot of blood. Fg. 2. View of the same region five months later.

Plate II.—Rupture of choroidal and retinal blood-vessels. Fg. 1. The l. o.n. and n.f. Fg. 2. The region of the r. yellow spot. Associated with an urismata of other arteries.

Plate III.—A duplicate of Plate II.

Plate IV.—Fg. 1. The r. o.n. and n.f. of a person suffering from diabetes insipidus. A large blood-clot occupies the centre of the o.n.; and numerous large and small blood-spots, and yellow opaque, etc., patches are seen in the retina.

Plate V.—Fg. The o.n. and n.f. of a person suffering from albuminuria. Numerous large and small blood effusions and

yellow and opaque spots are seen in the retina. Fg. 2. A view of the same two years later.

Plate VI. The r. (fg. 1) and the l. (fg. 3) o.n. and n.f. Fgs. 2, 4, and 5, represent other portions of the fundus of both eyes. The changes represented began during irregularities of menstruation.

Plate VII.—Fgs. 1, 2, and 3, represent different portions of the fundus of the r. eye. Associated with faulty menstruation.

Plate VIII.—Fg. 1. The o.n. and n.f. of the r. eye. Fgs. 2, 3, and 4, views of different portions of the vitreous space (?) of the left eye. Associated with irregular menstruation.

GROUP VI.—*Displacement of the retina.*

Plate I.—The o.n. and n.f. of the r. (fg. 1) and of the l. eye (fg. 2). The displaced retina appears white and opaque.

Plate II.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f. A greyish white opaque portion of displaced retina is seen in fg. 2. Fg. 3. Gives a view of an equatorial portion of the fundus; part of the displaced retina is white and opaque, part is still so transparent as to admit of a view of the choroid.

Plate III.—Fgs. 1 and 2 are enlarged duplicates of Plate II, fgs. 2 and 3.

Plate IV.—Fgs. 1, 2, 3, and 4, represent views of different parts of the fundus of an eye in which several portions of the retina have been displaced. The area of fgs. 1 and 2 is occupied by displaced retina. In fgs. 3 and 4 are seen small folds of displaced retina surrounded by apparently normal portions of the fundus.

GROUP VII.—*Atrophy of the vitreous humour, retina, choroid, etc.*

Plate I.—Fg. 1. The l. and fg. 2. the r. o.n. n.f. Fg. 3. The region of the yellow spot. Fg. 4. An equatorial portion of the fundus.

Plate II.—Fgs. 1, 2, and 3, are duplicates of Plate I. Fgs. 1, 3, and 4.

Plate III.—Fg. 1. The o.n. and n.f. of the r. eye. Fg. 2. An equatorial portion of the fundus of the same eye.

Plate IV.—Fg. 1, 2, and 3. Equatorial portions of an atrophic fundus.

GROUP VIII.—*Morbid changes of the optic nerve, and cases of amaurosis from extraocular causes.*

Plate I.—Fgs. 1 and 2. The r. o.n. and n.f. of a case of exophthalmos.

Plate II.—Fg. 1. Anæmia of the r. o.n. the calibre of the retinal vessels being normal. Associated with irregular menstruation.

Plate III.—Fg. 1. Anæmia of the o.n. the retinal vessels being extremely thin. Complication: blindness during suckling.

Plate IV.—Slight anæmia of the r. (fg. 1) and congestion of the l. (fg. 2) o.n. in a case of cerebral amaurosis.

Plate V.—Anæmia of the r. (fg. 1) and slight anaemia of the l. (fg. 2) o.n. in a case of cerebral amaurosis.

Plate VI.—Fgs. 1 and 2. Anæmia of both o.n.s. cerebral amaurosis.

Plate VII.—Fgs. 1 and 2. Anæmia of both o.n.s. The l. o.n. has a greyish white opaque, the r. a greyish blue opaque colour.

Plate VIII.—Fgs. 1 and 2. Anæmia of both o.n.s.; the stellate pigment of the choroid is well seen.

Plate IX.—Fgs. 1, 2, and 3. Anæmia (atrophy?) of both o.ns. with sequelæ of inflammation at the choroidal aperture.

Plate X.—Fg. 1. Slight cupping of the l. o.n. with morbid changes at the choroidal aperture, and with undisturbed circulation in the retinal blood-vessels.

Plate XI.—Fg. 1. Anæmia and slight cupping of the l. o.n., with a tortuous and congested state of the retinal veins after gonnorrhoeal ophthalmia.

Plate XII.—Fg. 1. An apparently swollen and congested o.n. l. eye.

Plate XIII.—Fgs. 1, 2, and 3. An apparently swollen and anæmic o.n. v. and l. eye. The retinal vessels show signs of pressure at the retinal aperture.

Group IX.—*Glaucoma.*

Plate I.—Acute glaucoma of the r. eye. Fg. 1. The r. o.n. and n.f. before iridectomy. Fg. 2. The r. o.n. and n.f. after iridectomy. Fg. 3. The l. o.n. and n.f.

Plate II.—Fg. 1. The r. o.n and n.f of an acute glaucomatous eye after excision; hœmorrhage into the cupped optic nerve. Chronic glaucoma.

Plate III.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f.

Plate IV.—Fgs. 1 and 2. The r. and l. o.n. and n.f.

Plate V.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f. Iridectomy had been performed on the left eye.

Plate VI.—Fg. 1. The r. o.n. and n.f.

GROUP X.—*Myopia.*

Plate I.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. Stationary myopia.

Plate II.—The o.n. and the n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. Progressing myopia.

Plate III.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. A higher degree of progressing myopia.

Plate IV.—Fgs. 1 and 2. An enlarged copy of Plate III, fg. 1 and 2.

Plate V.—Fg. 1. The o.n. and n.f. of the r.e. Progressing myopia.

Plate VI.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2.) eye. Progressing myopia. In front of the fundus of the r. eye near the o.n. is seen a small, white, opaque, fibrous-looking growth.

Plate VII.—Fg. 1. The r. o.n. and n.f. A high degree of progressing myopia. Fg. 2. A view of an equatorial portion of the fundus of the l. eye after excision.

Plate VIII.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. Progressing myopia, with a peculiar displacement of the retina.

Plate IX.—Fg. 1. An enlarged view of Plate VIII, fg. 2.

Plate X.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. Stationary myopia. Large and numerous blood spots are seen in the retina of the l. eye (fg. 2).

GROUP XI.—*Syphilis.*

Plate I.—Fgs. 1 and 2 l. eye. Inflammation of the choroid. Acute stage; formation of lymph, etc. Implication of the retina; o.n. and of the vitreous. Fg. 1. The o.n. and n.f. Fg. 2. The region of the yellow spot. Fgs. 3 and 4 are duplicates of fg. 1 and 2.

Plate II.—Fg. 1. Inflammation chiefly of that portion of the choroid, which surrounds the choroidal aperture. Implication of the o.n., etc.

Plate III.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f. of a person in which the vitreous has a peculiar milky hue. Fg. 3 is a duplicate of fg. 2.

Plate IV.—The r. (fg. 1) and the l. (fg. 2) o.n. and n.f. The view of the fundus is much obscured by posterior synechiæ. The choroid is in a state of chronic inflammation; the o.n., etc., are implicated. Fg. 3 the r., and fg. 4 the l. o.n. and n.f. The view of the fundus is much obscured by numerous grey opaque flocculi which are suspended in the vitreous space.

Plate V.—Fg. 1. A deeply cupped o.n. Fg. 2. A staphylomatous portion of the fundus from near the equator. The cases selected for the above plates, were suffering from secondary syphilis at the time; those for the following plates are cases of hereditary syphilis.

Plate VI.—Fg. 1. The o.n. and n.f. The choroid is in a state of subacute inflammation, the retina, o.n., etc., are implicated.

Plate VII.—Fg. 1. Sequelæ of choroiditis, etc. The o.n. and n.f. Fg. 2. An enlarged duplicate of fg. 1.

Plate VIII.—The o.n. and n.f. of the r. (fg. 1) and of the l. (fg. 2) eye. Sequelæ of choroiditis; morbid change of the l. o.n. Fgs. 3 and 4 are duplicates of fgs. 1 and 2.

Group XII.—*New growths (Tumours).*

Plate I.—Fg. 1. View of a tumour which originated at or near the o.n. It was found to be a fibrous growth which apparently originated in the fibrous tissue which surrounds the retinal vessels at the retinal aperture.

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Part I.

Original Contributions.

PRACTICAL REMARKS ON CONGENITAL CATARACT.

By G. Critchett, F.R.C.S., *Surgeon to the Royal London Ophthalmic Hospital.*

The former part of this paper was chiefly occupied in the description of the more common forms of congenital cataract, as they are observed both in the infant and in the adult. The two principal varieties I mentioned were cases in which the entire lens of the normal size is opaque, and cases in which the opacity is limited to the nucleus, the chief shades of difference being the relative extent of central opacity as compared with the transparent circumference, and the degree of opacity both in the partial and in the complete forms of congenital cataract, in both these respects we find in practice every shade of variety. I have also suggested my views as to the most eligible form of operation for each kind of case. I now propose in this latter part of the paper to describe some of the rarer forms of congenital cataract as they have come before my notice. These exceptional

cases derive their interest and importance not merely from their rarity as pathological curiosities; not merely as having been but imperfectly described in books, but also because the diagnosis of these cases is often difficult, the prognosis doubtful, and because the treatment presents some embarrassments, and requires some important modifications, and some careful management.

I propose to group the cases that deserve special notice from their rarity under the following heads:—

1. Moveable Congenital Cataract.
2. Fluid Cataract.
3. Congenital Cataract in which the Irides were wanting.
4. Congenital Cataract complicated with Conical Cornea.
5. Congenital Cataract in a deaf mute.
6. Congenital Cataract in one eye.

1st. Moveable Congenital Cataract.

In June, 1855, a gentleman from the country, æt. 24, applied to me complaining of extreme myopia. Concave glasses did not assist him. I dilated the pupils fully with atropine. I then observed the lens slightly opaque, of less than its normal size placed somewhat obliquely, moveable at its lower and inner part, and attached above; at the inner part there was a thin crescent of transparent space between the inner margin of the lens and the edge of the expanded pupil, through which long and clear vision was obtained. This result, thus sudden, unexpected, and enjoyed for the first time, was as surprising to the patient as to myself. I performed a needle operation in this case through the cornea in the usual way, and I found the lens so moveable that it yielded before the needle, and when penetrated rotated with it, so that I was compelled to introduce a second needle through the opposite side of the cornea before I could succeed in freely opening the capsule, and breaking up the lens. The cataracts were, in all respects, symmetrical in this case. I ultimately obtained complete absorption of both lenses with very good sight, both for near and distant objects.

There was a tremulous condition of both irides; this circumstance, together with the moveable condition, mal-position, and partially developed state of the lens made me infer that the retinæ would be somewhat impaired, but the result proved that my fears were unfounded.

Another case, of a somewhat similar character, has been already described in the former part of this paper. A young female, with partial congenital cataract in the left eye, the lens was detached at the lower part and sides, and swung backwards and forwards in the vitreous chamber. The sight was very defective in this eye, there being little more than perception of light, and the ophthalmoscope gave evidence of changes in the choroid and retina. Another case, somewhat similar, came under my notice about a year ago. A young lady was sent up to me suffering from considerable pain and dimness in the right eye. It appeared from the history of the case that, about nine months previously, she had fallen with some violence, and that immediately afterwards, she was conscious of pain, and dimness in the right eye; this had continued with varying intensity for some months. At the time I saw the case, the pain had in a great measure subsided, but there had been repeated relapses, and the dimness continued; it also came out during the inquiry that the sight of both eyes had always been rather defective, but not to such an extent as to prevent the young lady from fulfilling the duties of a governess. On making a careful examination of this case, I found that the lens in its capsule had been dislocated into the anterior chamber, and had remained there during these nine months perfectly unchanged, and without having inflicted any serious damage on the eye. I also observed that in the other eye, the iris was tremulous, and that the lens was moveable. Under the influence of chloroform I removed the dislocated lens through a moderate sized section of the cornea. The eye made a good recovery, with a clear central pupil; ultimately the range and accuracy of vision, when tested with suitable lenses, was found to be better than in the uninjured eye. No

doubt, in this case, the dislocation was in a great measure owing to the moveable state of the lens, and the looseness with which it was held in its position; a condition which was, doubtless, congenital. The case is interesting, as illustrative of one form of congenital defect of the lens; as suggestive of the kind of accidents liable to result from such deficiency; as showing the lengthened period during which a transparent lens may remain in the anterior chamber of the eye, without ultimate injury to that organ, and the safety with which it may be removed; it also shows that such accidents may be easily overlooked, and that wherever mobility and looseness of the lens is observed such an accident is liable to occur.

I have met with one case of congenital cataract in a deaf mute. It was a girl of 14, who was brought to me at the Ophthalmic Hospital in May, 1860. I operated in the usual way and with a satisfactory result; the aspect of the face, the condition of the teeth, and the early history, as far as we could obtain it, seemed strongly suggestive of hereditary syphilis, as the probable cause of both defects.

I have also met with a case in which congenital cataract was complicated with conical cornea. A young woman, æt. 24, came to the Ophthalmic Hospital in August, 1859, with congenital cataract of a pale grey colour, and in one eye a well-marked conical cornea. I removed the lens by linear extraction—subsequently with the aid of a concave glass, No. 4, good vision for distant objects was obtained. I have also met with one remarkable case of slight congenital opacity of the lens with congenital absence of the iris in both eyes. It was in a female, æt. 32, who came to the Ophthalmic Hospital in July, 1855. The opacity of each lens was arranged with a singular amount of regularity and symmetry, and were precisely similar in both eyes. There was slight oscillatory movement of both eyes. She was rather myopic, and was assisted by concave glasses, No. 6. She could read small print, and had some considerable power of adjustment; a strong light was distressing to her; I considered the sight was too good to justify an operation. The

case is of some scientific interest from its extreme rarity, and further as proving that the iris plays no part in adjustment, but is chiefly of use in regulating the admission of light, a circumstance that has since been shown in a most interesting case published by Professor Graefe, to be quite in accordance with the known laws of adjustment.

I have met with some rather curious cases of fluid cataract (congenital). In June, 1857, a boy, aged 12, applied to me at the Hospital with well marked white looking cataracts in both eyes. The pupils were active, there was only bare perception of light, as far as I could ascertain; the eyes and the sight had been in the same condition since birth. I proceeded to perform the ordinary needle operation through the cornea; the capsule was tough, and resisted the needle; when penetrated, the anterior chamber filled with a milky fluid, which I evacuated, and then drew out the anterior capsule, leaving a clear black pupil—precisely the same thing occurred in the other eye—the eyes rapidly recovered from the effects of the operation; vision was not very perfect, though it gradually improved. In August of the same year a girl of 17, came under my care with congenital cataracts; on introducing a needle through the cornea, and on puncturing the capsule, a thin milky fluid readily ran through the corneal wound, leaving a clear pupil; in this case the capsule was not so tough as in the former. The cataracts in both eyes were precisely similar; the eyes speedily recovered with good vision.

About ten days after, a gentleman consulted me respecting his son, a little boy, æt. 6, with defective intellect, and suffering from congenital cataracts. The moment the capsules were opened with a needle, a thin pale fluid escaped into the anterior chamber, and seemed to melt away, leaving a clear pupil; in this case both eyes were precisely similar: some sickness followed the operation; the eyes rapidly recovered, but owing to the defective state of the intellect, I could not ascertain to what extent vision was improved. It requires a very experienced eye to detect and prognosticate a fluid

cataract previous to the operation. The chief indications are rather an unusual appearance of whiteness and flatness, and an entire absence of all structure, and of all depth, and a complete inability to look into it; in such cases the capsule is usually opaque and tough, and the deeper textures are usually implicated in these changes, so that the vision that follows the operation is imperfect and below the normal standard; as a rule, I believe, it will be found that the imperfection of vision may be measured by the degree of toughness of the capsule. It would certainly be advantageous if we could diagnose this fluid state of the lens, previous to operating, as it would modify the mode of operating, and also the prognosis of the case. Whenever it proves to be a fluid cataract, and escapes into the anterior chamber it is better to allow of its escape to prevent sickness and pain.

The last group of cases to which I am anxious to direct attention, are cases of congenital cataract, as they are found in one eye only. Very competent authorities have described this affection as of extreme rarity, and have even been disposed to deny it altogether; but I have records of eight such cases that have come under my own immediate care, and therefore I am disposed to question the extreme rarity of their occurrence; but, beside the question of rarity, there are some special features in such cases that are interesting and important both to the pathologist and surgeon, and these I am desirous of describing. I will first endeavour to convey some of the impressions which these cases have left upon my mind, and a few practical points respecting the management of them. First, as regards their external aspect. There is usually a peculiar whiteness and distinctiveness about such cataracts, and when more minutely examined the surface is irregular, dry, and patchy, and some distance may be made out between the margin of the pupil and the body of the lens;—suggesting that the lens had become small, shrunken, and earthy within its white and tough capsule. All this, of course, becomes much more evident when the pupil is dilated. Not unfrequently there is some strabismus,

and when this exists, it is usually divergent. The perception of light is very faint, and is often merely quantitive. It is usually desirable to remove a congenital cataract of this kind, if it can be done with safety, partly in the hope of obtaining some sight, and partly to get rid of the deformity. It has been objected, that the newly acquired and comparatively imperfect sight may interfere with and confuse the sight of the other eye; this objection sounds plausible in theory, but practically it has no value. The weaker sight aids the stronger, but does not in any way interfere with it. The second and more important question has reference to the removal of the cataract—how far this may be accomplished with safety—and what are the peculiar difficulties and dangers that beset the case.

I have usually found the anterior capsule tough and unyielding; and I have met with cases in which it is impossible to penetrate with a needle. The lens itself is small, dry, chippy, and flat, having contracted within its capsule, and has an irregular surface. The capsule is not only tough but sometimes firmly attached to the ciliary ligament; it is thickened and sometimes corrugated into irregular folds, and contracted in its dimensions, and is so firm that it cannot be penetrated by the finest pointed needle, but yields and gives way before it. Within the capsule is a thin layer of condensed chippy lens, arranged irregularly so as to give the peculiar appearance that I have described. It is a matter of great practical importance to determine the safest and best means of getting rid of this peculiar form of cataract. To the inexperienced operator the proceeding is surrounded with embarrassment and danger, and is very likely to produce disaster. It is very difficult, if not impossible, to obtain solution of the cataract. The capsule is so tough and resistant that it is scarcely possible to effect an opening, and even if this be effected it rapidly closes again; or, if any of the fragments become detached and fall into the anterior chamber, they become a source of irritation, and may set up severe and even destructive inflammation. Perhaps no single method is adapted to

every case of this class, but the following plan I have found the best and the safest:

The pupil must be completely dilated. The lids must then be kept open with the wire speculum; a broad needle must then be introduced through the cornea; if the anterior capsule is tough and resistant, the point of the needle must be carried carefully round the margin where the anterior and posterior capsules join; here the needle will generally enter, and thus the anterior capsule may be detached and freed, or partially freed, from its surroundings. The use of two needles will sometimes aid this manœuvre, or the canula forceps must next be introduced through an opening made with a broad needle, and the tough anterior capsule must be drawn slowly and carefully out. Some difficulty may be experienced in seizing it with the blades of the little forceps; it may elude their grasp, and when seized near the margin it may break away; but by perseverance, by carrying the forceps well across the anterior chamber, so as to obtain a firm and extensive hold of the capsule, it can generally be ultimately drawn out. One important and difficult part of the operation is now accomplished; but another and an almost equally difficult feat, remains to be accomplished, viz., to remove the dry, chippy fragments of the opaque lens, it usually becomes broken up into fragments by the attempts to remove the capsule; these fragments must be carefully spooned out with the spoon of the curette, great pains being taken not to wound the hyaloid membrane, because, if once any of the fragments become entangled in the vitreous humor, it is almost impossible to remove them, and they remain in the eye as a source of irritation, and as an impediment to sight; if a fragment of this form of cataract happen to rest upon the surface of the iris it usually sets up severe inflammation, and may lead to closed pupil and destruction of sight. This is partly due to the firmness and partly to the insoluble character of the cataract; the fragment assumes all the characteristics of a foreign body, of which the surface of the iris is very intolerant. Thus it will be seen, that the

disembarrassing the eye of this form of cataract is encompassed with difficulties, and, I may add, with dangers, which nothing but a prescience of the exact condition of parts, and a practical acquaintance with the best method of meeting each difficulty as it arises will enable us to overcome. I usually give chloroform in these cases. As each case in a comparatively rare series presents some distinct points of interest and of practical value, I propose briefly to place them on record. The first case that I find in my note-book, I copy verbatim:—Sept. 12, 1854. At the Ophthalmic Hospital, I operated upon a curious case of congenital cataract in the left eye of a boy, æt. 11, the pupil was active, and on dilating it, a cataract, almost entirely composed of two layers of capsule with a little dry remains of lens between them, became clearly visible; upon the surface of the anterior capsule at the outer side, was a large triangular patch of black uvea, and at the lower border of the pupil was one firm point of adhesion between the margin of the pupil and the capsule; the right eye was perfectly normal. The case presented very much an appearance as if a needle operation had been performed, or as if it had been the result of accident. The history the mother gave me was curious, and without pledging myself to any opinion as to the influence of mental impressions upon the condition of the fœtus in utero, I think it right to state the facts as they were mentioned to me. When about three months advanced in the family way, an apprentice of hers was operated upon at the Ophthalmic Hospital for traumatic cataract, and was brought home, and under her notice immediately after, producing a sensation of distress and disgust; her first question when the child was born had reference to the state of its eyes. I found the anterior capsule tough, and detached it with two needles. I afterwards drew it out, leaving some small fragments of lens which I was unable to remove. These became gradually absorbed, leaving a clear pupil. Some weeks after, I operated for the strabismus, and the appearance of the lad was much improved; the sight of the

eye, however, remained very imperfect, not extending beyond a dim outline of objects. This case seems in many ways strongly to suggest a process of intra-uterine inflammation of the choroid and iris, with secondary change in the lens, as the cause; the adhesion of the pupillary margin, and the uveal deposits in the capsule are especially indicative of old inflammation, whilst the state of the capsule and lens, and the very defective state of the vision are further suggestive of the same cause, and are further suggestive of a similar origin in somewhat similar cases. This is the only case that has ever come under my notice, in which there was a single point of adhesion of the capsule to the pupillary margin, and a deposit of uvea upon the capsule, and it seems to me to be peculiarly interesting and suggestive. The next case applied to me at the Hospital, in May 5, 1855. A boy, æt. 10, with congenital cataract in the right eye only; the pupil was active; when widely dilated, the lens appeared white, irregular in its surface, and seemed to have fine fragments of chalky matter scattered through its substance. I freely broke it up with a needle into small portions; it gradually absorbed but kept up irritation for some weeks; the sight was very imperfect after the operation. The peculiarity of the case was that the capsule was brittle, and was easily torn up with the lenticular substance. There was no strabismus in this case.

The third case was that of a gentleman, æt. 24, who consulted me respecting a cataract in the left eye complicated with strabismus internus;—the pupil was immoveable, adherent, and rather dilated. I placed the patient under the influence of chloroform, and proceeded to divide the internal rectus muscle, so as to remove the strabismus. I then proceeded to extract the cataract. I found the anterior capsule was tough and impenetrable, I therefore carried the needle round the edge where the anterior and posterior capsules united; in this way I gradually detached the anterior capsule and drew it out with the canula forceps. I then proceeded to remove, bit by bit, the dry, chippy frag-

ments of the lens with a small silver scoop. In this I, to a great extent, succeeded, but some few pieces eluded my efforts, probably from becoming entangled in the hyaloid membrane. Considerable irritation followed the operation, which was slow in subsiding, and left the pupil closed and filled with lymph. No further operative attempt was made. The sight remained about the same as before the operation, viz., a bare perception of light. The aspect of the patient was somewhat improved by the operation. I am disposed to attribute the inflammation and closure of the pupil to the fragments of lens that remained in the anterior chamber and irritated the iris.

On the 29th of the same month, in the same year, a girl, æt. 15, applied to me with congenital cataract of the right eye only. It presented a precisely similar appearance to those I have already described. The patient having been placed under the influence of chloroform, I very carefully detached the tough anterior capsule and drew it out. I then by degrees removed every particle of the lens; and lastly, I drew out a thin but tough posterior capsule, leaving a perfectly clear pupil. No irritation followed, but the eye rapidly recovered with a clear round pupil; the sight was very defective. I attribute the favourable result to the completeness with which every particle of the cataract, including the capusles, was removed, without wounding the hyaloid membrane.

In December, 1857, a young gentleman, a clerk in a mercantile house, consulted me respecting a congenital cataract in the left eye, complicated with divergent strabismus. The pupil was fixed and widely dilated, and there was only very faint perception of light. Under the influence of chloroform I first operated for strabismus, and then liberated and drew out the capsule. I subsequently removed the fragments, leaving a clear pupil. Some irritation followed. About three months after I carefully examined the eye—its external aspect was natural, but the tension of the globe was below the normal standard; and, on lighting up

the fundus with the Ophthalmoscope, a yellowish white mass could be seen, the result probably of some effusion between the choroid and retina. There was not the faintest perception of light.

In this case I am disposed to attribute the failure in some measure to the disorganized state of the globe previous to the operation—it was mainly undertaken for the removal of the deformity, and in this respect the result was satisfactory.

In June 21st, 1859, I operated upon a young woman at the Ophthalmic Hospital with congenital cataract in the right eye—the pupil was active, but the cataract presented the same flat, dry, friable character as those I have already described. The capsule was equally brittle with the body of the lens. With a broad needle I broke it into small fragments, which I removed with the scoop of the curette. Some little vitreous escaped through the wound as the last fragment was extracted.

This case made a rapid recovery with a clear round pupil; there was also a fair amount of useful vision both for near or distant objects. There was no strabismus in this case.

Three days subsequently to the operation upon the above-mentioned case, I operated at the Ophthalmic Hospital upon a boy, æt. 14, under chloroform, with congenital cataract in the right eye. The left eye had been destroyed by an accident about a year previous to his applying to me. The pupil was active, but there was very faint perception of light, the pupil having fully dilated. The cataract presented the appearance usually observed in these cases. On introducing a broad needle, I found the anterior capsule was thickened, tough, and contracted, and there was some difficulty in detaching it from the posterior capsule. I drew it out with forceps and then removed the lenticular matter which was softer and more abundant than usual, and easily escaped. The eye quickly recovered, and the boy went into the country; but as far as I could judge very little light was gained by the operation.

The last case of congenital cataract in one eye, of which I have record, was brought to me in the month of March of this year; it was in the left eye of a child six months old. The pupil was active; it had all the appearance of an ordinary soft cataract. Under chloroform, I freely opened the capsule and removed it with a scoop through an opening in the cornea, leaving a clear pupil. No irritation followed the operation. The mother attributed the disease to a severe blow she received from her husband on her left eye at about the 4th month of pregnancy. I consider this a very rare case: I have no record of anything similar in my note book.

I have thus given a brief account of those cases of congenital cataract, limited to one eye, that have come under my immediate notice during the last seven years. I think they will be found fully to confirm the observation with which I introduced this branch of the subject. It will be seen, that in all these cases there is a remarkable similarity both in the appearance and in the condition of the cataract, —the chief difference being in the degree of firmness in the anterior capsule. My impression is, that toughness of the capsule is an unfavourable symptom, and usually co-exists with serious morbid changes in the choroid and retina, and that it depends upon intra-uterine inflammation. As my experience has gradually increased, I must confess that I have approached these cases with more and more caution and misgiving; I have been careful not to promise any considerable accession of sight; and I have become more and more convinced of the importance of removing every particle of the cataract from the eye, and of the difficulty of accomplishing this object. I am not aware that this particular form of cataract has been clearly described, nor has this particular mode of operating, suitable to such cases, been insisted upon. I am, therefore, not without hope that this portion of my paper may be found useful to Ophthalmic surgeons.

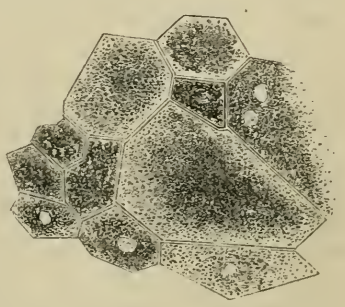
THE EPITHELIUM OF THE CHOROID.

By J. W. Hulke.

The inquiry having been made since the publication of No. XIII (in which the term is used), what is meant by *macroscopic* choroidal epithelium, it has appeared to me that a few remarks on the epithelial layer of the choroid might be useful. The inner surface of the choroid consists of a single layer of flattened cells, for the most part hexagonal, and averaging, in a specimen now before me, $\frac{1}{1433}$ of an inch in size. The cells contain a bright, circular nucleus, which is usually central, and are more or less completely filled with hard angular particles of brown pigment; these, when sparingly present, are uniformly distributed throughout the interior of the cell, but when abundant, are more densely clustered around the nucleus, which they often hide. The epithelium rests on a structureless membrane, which, in its transparency, its chemical characters, its anatomical relations, and the morbid changes to which it is prone, resembles the elastic laminæ of the cornea, and the capsule of the lens, and is called the elastic lamina of the choroid; its outer surface is in relation with the chorio-capillaris.

I am not acquainted with any observations on the growth or repair of the choroidal epithelium in health. An active metamorphosis of tissue would seem to be provided for by the ample capillary net from which the epithelium draws its nourishment; and the ophthalmoscope shows that, in connection with vascular excitement, an excessive quantity of pigment is sometimes very rapidly produced. This is seen in the black flocs which so soon cluster round inflamed patches of choroid. The effects of inflammation may be very conveniently studied in the spots of choroiditis disseminata. The area of these spots is white; because,

in consequence of the disappearance of the pigment epithelium, the yellowish-white inner surface of the sclerotic comes into view. The continuity of the choroid as a distinct membrane is not interrupted; for the elastic lamina ts present, dotted over with a few pigment particles scattered singly, or in small clusters. The chorio-capillaris is more or less wasted, — often completely so. The multipolar pigment-cells of the stroma are sometimes as numerous as in health; in other cases less abundant, and rarely wholly absent; and the larger vessels often show no signs of disease. Towards the border of the spot the pigment particles are more numerous, and the clusters more abundant. Most of these seem to be mere aggregations of particles; and, although often deceptively like cells, yet a distinct bounding membrane is often not demonstrable. At the extreme border of the spot these cell-like clusters are mingled with indubitable cells, the membrane of which is distinctly visible. These cells do not all lie in the same level; their shape is distorted, and size very variable: some are elongated in a direction parallel to the border of the spot. Some are very small, much below the average size of the healthy cells; these are often rounded and crammed with pigment, so as to be dark brown, or even almost black. Others as greatly exceed the normal dimensions, and are really colossal. The Germans have distinguished these by the term *macroscopic*. The largest cell represented in the accompanying figure, measured $\frac{1}{430}$ of an inch by $\frac{1}{235}$. In recent preparations, the sides and angles of these cells are clean and sharp. There is no evidence of their production by the fusion of neighbouring cells. They may be seen of all sizes, in all stages of growth, and are instances of simple hypertrophy.



MEDICO-LEGAL OBSERVATIONS IN CONNECTION WITH LESIONS OF THE EYE.

By A. Poland.

There are no injuries more seriously important than those from which loss of vision may result. The first consideration of the sufferer is, whether the eye is lost, or is likely to become defective; for of such value is sight, that the question of losing it or not is most anxiously asked, and the decision of the surgeon is awaited in the utmost suspense.

When the accident has been caused by the negligence or wilfulness of another, the sufferer may and can claim compensation from the person or persons who have inflicted the injury. Since our connection with the Royal London Ophthalmic Hospital, Moorfields, we have been engaged in several cases of this class. In some, the persons concerned have been enabled to settle matters by arbitration; in others we have had to appear in a court of law to give evidence as to the amount of damage done to the eye. Of these last we have selected two of the most interesting, containing some facts which may be useful to our readers.

But before detailing these cases, we have been persuaded to offer a few remarks on the duties of the medical profession, in medico-legal inquiries generally, in matters of compensation for injuries received or caused by negligence or accident. The subject being one not usually adverted to in our standard works on medical jurisprudence, perhaps the following curt remarks may not prove unacceptable.

In all civil legislation it has been distinctly laid down, that every person causing injury to another, must give reparation; and again, every one is responsible for the damage which he has caused, not only through his own act, but also for that which has resulted from his negligence and imprudence. He has one saving clause, which has generally

led to litigation, viz.:—the proof *that no reasonable care on his part could have prevented the accident.*

With regard to the assessing of damages from accidents, &c., Mr. Harry Bodkin Poland, Barrister-at-Law, has expressed the following opinion in answer to the question put to him on this point. He writes—"There is no fixed mode of assessing damages from accident. When it can be shown that a particular person is liable for causing an accident, &c., the jury decide as to the amount of damages to which the injured person is entitled, and neither the medical man nor the lawyer interferes, except to put before the jury the real nature of the injuries inflicted. It is important to bear in mind the distinction, in a legal point of view, between *exemplary* damages and damages considered simply as *compensation*. In matters simply of injury to property, where no right is invaded and no malice alleged, the Court will direct the jury as to the rule of law, by which they must assess the compensation; but where neglect or wilful and malicious intention intervenes, the jury will assess damages at their *discretion*, and the element of punishment is added to that of compensation, and the damages thus assessed are called exemplary damages. Should the jury, however, give damages either too small or excessive, even though a palpable mistake, the Court will not interfere to alter the amount, but will grant a new trial, in order that the opinion of another jury may be obtained."

In general the matter is settled by private arrangement, or by arbitration.

Now, it is well known that the medical profession are very frequently consulted (in conjunction with arbitrators or not, as the case may be) in estimating the amount of damages which should be awarded to the sufferer for reasons to be hereinafter mentioned. And here, on the very threshold of our inquiry, we must distinctly impress upon our readers' notice and attention, the fact that it forms no part of the duty of a medical practitioner, as such, to assume the function of arbitrator, and assess damages accordingly. By strict

law, he has no business to mix himself up in matters of this kind; his duty consists essentially in the treatment of the injuries received, in the most efficient and expeditious manner, irrespective of the circumstances under which they occurred; and when called upon for his opinion of the case, he is bound to give a just and accurate account of the lesion, the length of time requisite before a perfect recovery may be effected; the result and influence it may have on the position, occupation, and future capabilities of the injured person.

Although the medical profession have no business to assume to themselves the power of estimating damages, yet, on account of their knowledge and intimate acquaintance with all the facts, present and future, in connection with the injury, as well as also their generally high integrity and devotion to the public at large, they are most frequently selected to undertake this unpleasant office; and either alone or in conjunction with friends or arbitrators, they become the medium of communication between the sufferer and the aggressor, and are required to exercise the necessary discretion and wisdom for settling the question of compensation; and by so doing, enable both parties to avoid the heavy expenses of litigation.

The great knowledge which the profession possess, in estimating the amount of injury inflicted and its effects upon the human frame, has been wisely made use of by the several railway Companies of this kingdom, who have appointed a medical officer to take into consideration these very points, when an injury has been sustained by accident or neglect, on any part of their line. Where this duty is performed conscientiously alike towards the injured person and the interests of the Company, by awarding fair and liberal compensation, litigation is avoided. The law reports show that, unhappily, this is not always the case.

In considering the whole subject in a legitimate manner, we must bear in mind, that in every case in which the medical adviser is called upon to act or advise three points

demand his closest attention: 1st, His duty towards the sufferer; 2nd, His duty towards the person or persons responsible for the injuries; and 3rd, His duty to himself. It is by neglect of these three grand principles, that the medical profession has lost so much prestige in the eyes of the public, and more especially when examined in a court of law. Thus, some have been too selfish and only looked after their own interests; others again have thrown all their attention and the weight of opinion on the side of the sufferer, and unwisely demanded on his behalf compensation of a most preposterous character, utterly regardless of all consideration for the aggressor, for whom he ought to have had some compunction; and again, there are others, who are employed by, and receive paltry sums from, public Companies to look after their interests, who sometimes award the lowest possible damages.*

Legal proceedings invariably follow where unjust demands are made on either side: viz., where the injured person over-states and over-rates his injury; or where the aggressor under-estimates and under-rates the damage he has done. And here again we sometimes find the medical profession engaged on both sides; and it does not raise them in public opinion, when, in law suits, we find one body of medical witnesses arrayed against another, each recording his opinion according to the interests in which he has been subpœnaed.

I. *The Duty of the Medical Practitioner towards the Sufferer.*

Whether the injured person be rich or poor, the medical practitioner is bound to give him the best possible advice and

* We are glad to find that there is a gradual leaving off of the practice by medical officers of receiving blank cheque books from the Company and hastening to the scene of injury, and settling damages then and there to the detriment of the unfortunate sufferer, who is at such a time ill-able to estimate his injury or its subsequent effects. This practice has been publicly condemned by the Judges of the land, as one not being strictly in accordance with the objects of a noble and scientific profession.

attention, and where difficulties arise as to the diagnosis, prognosis, or treatment, he is bound to have no hesitation whatever in seeking and obtaining the highest opinions, be they of the Physician or Surgeon, so sharing the responsibility as to the consequences of the injury. This is more especially important as regards injury to the eye, for an eye may be saved by the timely assistance of the surgeon; thus many a case of traumatic cataract, when the lens has become dislocated into the anterior chamber, and is setting up irritation, has been saved by early extraction; and many an eye has been lost by inattention to this point, allowing a slow, insidious inflammation of the internal tunics to ensue.

It is also a matter of consideration with the practitioner, whether the sufferer should be hurried away to a hospital instead of to his own house and family, in consequence of the aggressor's endeavours to relieve himself, by so doing, of all medical charges which must necessarily ensue, and for which he will be held responsible. We know an instance in which a person of property, by negligence, caused the rupture of the eye of a poor person having a tolerably comfortable home, with wife and family; he sent him immediately to one of the London Hospitals, and thus evaded all legitimate medical expenses, and put the family to the unnecessary trouble of daily visiting him. On the other hand, we recollect an instance in which the butler in a gentleman's family met with a severe injury to the eye by the incautious manner in which he opened a bottle of soda water; now although the sufferer was his own immediate aggressor, yet the master of the house sent for his own medical practitioner, and afterwards ordered his carriage to town, and caused one of the first consulting oculists to be brought down forthwith, and he undertook to defray all the expenses incurred.

These, of course, are two extremes, yet a fair medium might have been attained in either case.

II. *The Duty of the Medical Practitioner towards the author of the injuries.*

Whilst the medical man takes the greatest interest in the bodily welfare and condition of the sufferer, yet he must not forget that he also owes a duty to the aggressor: the injury for the most part, is not wilful, for then it might lead to a criminal prosecution; it is accidental, or caused by want of forethought, or common prudence, and he the aggressor is then held responsible for the damage which he has caused, provided reasonable care on his part could have prevented it. The medical practitioner should be careful in not exaggerating the mischief; he should also be considerate in his number of visits and in his charges; and he should see that the patient does not exact too much, by reckless proceedings and attempts at extortion. In injuries and affections of the eye all is clear and straightforward, and the practitioner can always judge for himself the actual condition of the organ. It is always advisable to apprise the aggressor of the nature of the injury, the probable length of time requisite for recovery, and its effects on the prospects and future occupation of the sufferer. He will then judge for himself the extent of his liability, and will, in most instances, make reparation or some compromise satisfactory to the sufferer.

Where the patient is too exacting, the medical charges too exorbitant and out of all proportion, then the aggressor feels bound to appeal to a jury. This latter is to be avoided, if possible, in consequence of the costs attending such action; the verdict generally goes with the sufferer, but with proportionate damages, generally half the amount claimed, and even only nominal, where there has been an attempt at extortion; the legal costs, however, fall upon the aggressor.

The position and means of the aggressor must likewise be taken into consideration, and this will materially modify the damages: thus, a wealthy person can well afford ample compensation; but a poor man or labourer earning 25*s.* a week, or less, can give only a trifle towards mitigating the injury

he has caused. Where a boy is the aggressor, some modification will be requisite, as, in all probability, the damages will, though indirectly, fall on the parents, who are, perhaps industrious, hard-working people.

III. *The Duties of the Practitioner towards Himself.*

These have been for the most part alluded to in the foregoing observations, yet there are several other circumstances which he will have to consider and bear in mind in the class of cases here alluded to. He must make himself perfectly acquainted with all details of the accident, the position and condition of all parties concerned; in fact, inquire into all those circumstances laid down in works on Medical Jurisprudence relating to the infliction of wounds and injuries.

For the estimation of the amount of compensation he must fairly put before the parties concerned all necessary information which may tend to lead them to a proper and just decision; and the following points must be attended to; these we shall but briefly enumerate, as it would be impossible to enter upon each fully.

It is essential to draw up an accurate and minute description of the accident or injury, avoiding as much as possible all technical terms, so that its nature may be readily understood by the unprofessionals. The importance of this will be easily seen by perusing the cases adduced. In the case of an eye we have now every possible means of predicting the result; the ophthalmoscope will enable us to detect effusion of blood about the retina, detachment of the retina, &c., &c.

The age of the patient has to be taken into account. The young repair damages much more readily than the old, in whom often a slight injury is dangerous, and tedious in recovery;—this is more particularly seen in injuries to the eye, especially in cases of traumatic cataract; in the one instance, often readily absorbed without further mischief, whereas in the other often setting up consecutive inflamma-

tion of the eyeball, unless speedy attention be given to the case.

But where an important organ, as an eye, is lost, it is much more serious to a child than to a grown-up person; for the former has to make his way through life at greater risks, and his all depends upon the one sound eye.

The sex bears materially upon our judgment. Injuries are of more consequence to the male, as he performs the more laborious and arduous undertakings of life; at the same time we must recollect that females are more delicate, and less able to withstand shocks, contusions, &c., and their nervous system is more liable to derangement; but in the matter of sight, the balance is pretty equal.

The state of the constitution and health at the time of the injury must be taken into consideration; naturally strumous or scrofulous individuals do not sustain or repair injuries very well; neither ill-nourished, nor over-fed persons, nor those who are suffering from disease or cachexia, nor the habitual drunkard: all these conditions will modify the amount of damages.

The occupation, trade, or business of the patient as effected by the injuries received; thus an injury of the ankle or foot to a dancer, the eye to a watchmaker, artist, engraver, compositor, &c. These circumstances offer such a variety of modification, that it is impossible to lay down any general rules for guidance, inasmuch as each case must be decided on its own merits.

Any peculiar conformation of the part injured, and rendering it thereby more liable to damage, is often pleaded in mitigation;—thus Devergie mentions (vol. ii, p. 259, 2nd edit.) a case, where the plaintiff received a blow on his left eye, which was followed by inflammation of the internal structures, cataract, and total loss of vision; he had a natural prominence of the eyeballs, and the defence set up was, that his condition had much influence in the unfortunate results of the blow.

There is one thing to be borne in mind, that should the

patient aggravate the injury by neglect or otherwise, or should he place himself in the hands of an incompetent person, he may considerably diminish the amount of damages, which would otherwise have been awarded to him.

Having now briefly stated some of the general considerations necessary for all classes of injury, we will now apply them more especially to such as affect the eye alone.

Accidents to the eye are by no means uncommon, and consist of every possible variety of lesion, for a full account thereof the reader has only to refer to Mr. Cooper's work on "Wounds and Injuries of the Eye," where he will find collected all the most important lesions on record.

In estimating the frequency of this class of injury, we cannot gather any proximate results; the several hospital returns answer no purpose whatever for our object, for they embrace all the minor lesions: viz., the presence of foreign bodies, fragments of metal, &c., which are exceedingly numerous, and cause generally but little serious mischief.

To be of any use the returns ought to state the actual nature of the lesion, they should be classed under Contusions, Non-penetrating Wounds, and Penetrating Wounds, in each of which the following effects should be stated, whether recovery without loss of sight; whether followed by partial loss of sight, or total loss of sight; and, again, whether it be the right or left eye, or both.

Again, where one eye has been injured, it is well known that it is liable to secondary inflammation, and may set up a sympathetic affection of the sound eye, so that this circumstance must be fully taken into account. Here also our hospital returns afford us no evidence. Mr. Cooper, at p. 300, has attempted something of the sort, and records sixty-two cases, which he has collected; but these are selected cases, and not so many sympathetic inflammations in so many injuries. What we want to know is the relative proportion of secondary inflammation and sympathetic inflammation in the sound eye, after wounds and injuries of

the other eye. As far as our experience goes, it is not so great as is generally imagined; but this must be determined by facts.

Lawrence (on "Disease of the Eye," Edit. 3rd, 1844, p. 159), long ago drew attention to the circumstance; he writes :—

"The influence of one eye upon the other is not confined to cases of disease. When an eye has been lost by accident, the other often becomes diseased sooner or later, without any imprudence or any external influence that would be injurious under ordinary circumstances. This kind of occurrence is so common, that it is necessary to warn those who have lost an eye of their danger, and to point out the necessary precautions for avoiding it. For this affection of the sound eye, if it is not noticed and properly treated in the early stage, often destroys sight. Its most common form is slow inflammation, which may affect the iris, the retina, or the internal tunics generally. Rest of the eye, anti-phlogistic means, and free use of mercury, are the principal points of treatment.

Mr. Cooper, at page 319, thus also alludes to this subject :—

Though blindness of both eyes is only exceptionably the effect of injury to one, it must be borne in mind that the pursuits and occupations of a person who has lost one eye materially influence the preservation of the other, as the entire labour is thrown upon it; it is evident that any pursuit requiring intense visual application is injurious; and the risk will be great in proportion to the length of time during which the strain on the eye is kept up, and the amount and position of light in which the work is carried on.

The causes which may lead to the loss of an eye through carelessness and negligence ought well to be borne in mind by the thoughtless, so that should any person be employed in any of the following acts, he should pay due regard to the passers by, or those standing near, and thus obviate any necessity for rendering himself liable for the damages thus committed.

The carrying or whirling about of sticks, umbrellas, guns, &c., in the public thoroughfares, the slashing about of whips, the careless use of the line and rod in fishing, the letting off of fireworks, the shooting of arrows, the throwing of missiles, such as stones, lime, &c., &c.; the chipping of

wood, stone, and metals in the public highways, without adequate protection; the playing at tip-cat; the uncorking of effervescing draughts; the explosion of chemicals and gunpowder, and numerous other acts, each and all of which have caused the loss of an eye or of both, and have been the means of litigation.

Sportsmen must specially be on their guard, and must recollect that shot may be deflected, even from twigs of a tree; and that they should never fire near a person who is in advance, in whatever position he may be.

The next point will be to mark the precise nature of the lesion and its effects immediate and remote on the functions of the eye.

Wounds of the lid may cause deformity, ectropium, &c.; division of the lacrymal duct and so may give rise to epiphora, or fistulæ lacrymalis; wounds and contusion of the brow may be followed by amaurosis.

Wounds and contusion of the eye may be attended with partial or total loss of vision in one or both eyes, and may be succeeded by secondary and sympathetic inflammation.

All these points must be satisfactorily established, as the result of the injury, and due and proper attention been paid to obviate the effects produced.

We are very often called upon to prove that the accident was the result of negligence, and we may often do so, as is shown in one of the cases adduced, by determining the actual mode in which the injury has been inflicted, by ascertaining the relative position of the sufferer, and the person or spot from whence the mischief proceeded; then making an accurate examination of the eye, so as to find out the course which the penetrating body has taken, viz., the position of the wound in the lid and the globe, and its course through the sclerotic or cornea, iris and lens.

We must, however, bear in mind that the missile may glance off and not enter the eye, or may run under the conjunctiva.

Or again, the wound in the lid may not correspond with

the wound in the globe, and thus give rise to much difficulty, as instanced by Mr. Cooper, at page 2 :—

Case of wound by a penknife, where the punctures in the lid and the eye corresponded so little, that had I not seen the case immediately after the accident, I should have doubted the possibility of their having been inflicted by the same stroke ; at the moment of the accident, the instinct of preservation caused the cornea to be thrown so powerfully upwards, that the lower part of the sclerotic was pierced by the knife, which passed through the upper lid.—(See diagrams and case related in full at page 116 of his work.)

We now come to the main question at issue, "What is the value of an eye? What compensation should be demanded by a fellow creature deprived of the sight of one eye or both?"

Mr. Cooper, at page 318, observes:

The value of an eye is in reality variable ; it is of less value to a husbandman who follows the plough than to a skilled artisan, and though the loss to every one is grievous, the fortunate possessor of ample means can better spare an eye than an artist, an architect, or a surgeon. As the idea of projection and roundness can only be gained by the combined action of the two eyes, the prospects of an artist are most seriously damaged, if deprived of this power, so important in his profession.

* * * *

The helplessness of a person who has lost the sight of one eye has passed into a proverb, and the inability to see objects on the blind side exposes the individual to perils, especially in London, where the crowded state of the streets often render it difficult to cross with safety, even with the advantage of both eyes.

Although there is no fixed scale or rule by which we may be guided in awarding compensation in civil life, yet we may take for our assistance in this respect the regulations and proceedings laid down in military practice.

Deputy-Inspector Longmore, Professor of Military Surgery at Fort Pitt, Chatham, in reply to queries addressed to him on the subject, has furnished us with the following replies and notes, of which he has kindly permitted us to make use.

Rules for compensation to military officers for complete or partial loss of vision contracted on service.

The rules which guide compensation awarded for complete or partial loss

of vision in the army are different for commissioned officers, from what they are for non-commissioned officers and privates. I will mention these separately;—

I.—Officers.

(*a.*) Officers can only claim compensation for partial or total loss of vision contracted in the service, when the disability referred to is the result of a wound or injury received in action with the enemy.

(*b.*) The loss of one eye, right or left, is considered equivalent to the loss of a limb, and the compensation is the same; the loss of two eyes is equivalent to the loss of two limbs, and the rate of compensation is doubled.

(*c.*) The rates of compensation for complete loss of vision in one eye vary according to the rank of the officer; as the probability is that the higher the rank the less time will the individual live to draw the pension.

The compensation is of two kinds—the first a gratuity; the second a pension.

The gratuity consists of a sum of money equal to one year's pay of the regimental rank or staff-appointment, which the officer held at the time he received the injury causing the loss of vision. This gratuity the officer is entitled to on a simple certificate from a commanding and medical officer, stating that the loss of sight resulted from a wound received in action. It is usually spoken of as "blood-money."

The pension can only be obtained after the claimant has been examined by a Board of Army Medical Officers, and after the Board has reported to the Secretary of State for War, that vision is completely lost, or that the injury is equal to complete loss of vision, and that the loss is attributable to the effects of a wound or injury received in action.

For the loss of one eye, the following are the rates of pension according to rank. (See War Office Circular, No. 638, or Royal Warrant of the 27th October, 1860):—

	Per Annum.
Lieutenant-General	£400
Brigadier-General	350
Colonel, Lieut.-Colonel, or other Officers of corresponding rank .	300
Major; if in command	250
Major, and other Officers of corresponding rank	200
Captains „ „	100
Lieutenants „ „	70
Ensigns „ „	50

The officer must appear at least twice in the course of the first five years after the wound was received, before the pension is established as a *permanent pension*.

The pension does not commence until one year after the receipt of the wound.

(*d.*) If vision has only been partially lost in consequence of a wound or injury received in action, and this impairment be severe, and like to be of a *permanent* character, the officer may receive a gratuity, similar to that

already described for total loss of vision, and he may be recommended for a *temporary pension*, the continuance of which will depend upon examinations from time to time by a Military Medical Board.

(*e.*) In all cases, whether the loss of vision be complete or only nearly so, the Medical Board must certify that it is solely attributable to the effects of the wound received in action, and the disability must follow the wound within five years after its receipt.

(*f.*) The loss of vision of one eye does not incapacitate an officer for service, and the pension for the wound is given in addition to the pay and allowance of the duties in which the officer may be employed.

(*g.*) Neither age nor length of service influence the rate of pension; it is rank only, according to the scale before given.

(*h.*) The report of a Medical Board regarding the condition of an officer preferring a claim for compensation for a wound of an eye has to be regulated according to the following terms:

1st. Loss of an eye—equal to the loss of a limb;

2nd. Nearly complete loss of vision—nearly equal to the loss of a limb;

3rd. Severe injury to an eye—{ but in its permanent effects, not nearly equal to the loss of a limb.

These terms guide the non-professional authorities, who have to determine the rate of pension.

(*k.*) Officers, to whom the third term is applicable, may receive a gratuity varying according to circumstances from 3 to 12 months' full pay of the rank or appointment held by them at the receipt of the wound. The Secretary of State for War decides the amount of gratuity.

II.—Non-Commissioned Officers and Privates.

All claims for pensions by non-commissioned officers and privates of the army are decided upon by the Board of Commissioners, who are entrusted with the management of Chelsea Hospital.

The following is the scale within which the Chelsea Commissioners grant pensions to discharged non-commissioned officers and privates for loss of sight of both eyes contracted in the service, whether from disease or from wounds received in action:

	Blind from any cause.	Blind from severe wounds received in action.
Serjeant	From 1*s.* 3*d.* to 2*s.* 0*d.*	3*s.* 0*d.*
Corporal	„ 1*s.* 0*d.* to 1*s.* 3*d.*	2*s.* 4*d.*
Private	„ 0*s.* 9*d.* to 1*s.* 0*d.*	2*s.* 0*d.*

Professor Longmore remarks—"Now that so much attention is paid to rifle practice, the quality of sight is a

matter of great importance in the value of the soldier, more especially the power of vision in the right eye; and again, impaired sight is becoming a more frequent source of soldiers being discharged from service than formerly.

Blindness contracted while the soldier is in the service, whatever the cause, whether disease or wounds, entitles him to a pension. Being no longer efficient, a soldier who becomes blind is always at once discharged from the army.

It is only after being discharged, that non-commissioned officers and soldiers become capable of receiving pensions, although the blindness may have resulted from wounds received in action.

They are not entitled to any gratuity for wounds of any kind, nor can they receive any pension, while continuing to serve, as officers may do."

Such are the rules and regulations of the army, and these will offer some basis for us to act upon. We will not venture to make out a tariff to suit all individual cases in civil practice, for it would be utterly impossible so to do. Each individual case must rest upon its own merits, which will be estimated from all the concomitant and attending circumstances.

In conclusion we reluctantly terminate this incomplete article by appending a few important cases in matters of compensation and interest.

The discrepancies in the amount given by verdicts depend not so much upon the actual worth of the organ, which is well known to be inestimable, but upon the position and means of the author of the mischief. Thus the remarks of Mr. Cooper at p. 310, may be explained away in that manner. His observations state—

"I have been much struck with the varying amounts awarded as compensation for the loss of an eye. It was with indignation that I read in the report of a cause tried at the Rochdale County Court, that *twenty-six shillings and sixpence* had been considered sufficient compensation to a poor lad, one of whose eyes was maliciously destroyed by another boy filling it with lime. The Rotherham County Court was more liberal, awarding 15*l.* to an iron worker, whose eye was destroyed by the carelessness of a fellow workman."

Now it is not improbable that in both of the above cases the aggressor was not in a position to pay more, and the only alternative would have been a criminal prosecution, which would have answered but little purpose as the sufferer would, instead of obtaining any reparation, be involved in considerable expense.

Case I.

A little boy, accompanied by his grown-up sister, was passing over one of the London bridges, where some pipes were being laid down, and where the men were at work chipping off some of the iron tubing at the time; a piece flew off and struck the child in the eye. He was brought to the Ophthalmic Hospital, Moorfields, soon after the accident, and was admitted under my care; the case was one of penetrating wound of the sclerotic and cornea, with injury to the lens and retina, and attended with irreparable loss of vision. The boy was the son of poor working people, and as his future prospects would be materially influenced by the loss of his eye, the parents thought that some compensation ought to be given in some shape or way. The contractors for the work were applied to; but they refused to give any damages, on two grounds, first they were not liable; and secondly, that it arose from the child's own fault and neglect. Their liability to be sued, should the second question fail, was confirmed by the fact, that they were bound to take care and guard against any accidents likely to accrue in the course of the works, by erecting and using such proper means as to obviate any dangerous results. The second point raised was, the statement of the foreman in charge of the works, and corroborated by one of the workmen, viz., that the child was standing on the curb of the pavement, looking down into the trench where they were at work, and that they repeatedly told the child and his sister to move away. This the latter denied, and the singular nature of the accident entirely corroborated the statement of the boy and his sister, viz., that they were walking along over the bridge, and were not standing still looking down into the trench, but looking straight forward. The annexed diagram will sufficiently explain the facts.

Fig. 1.

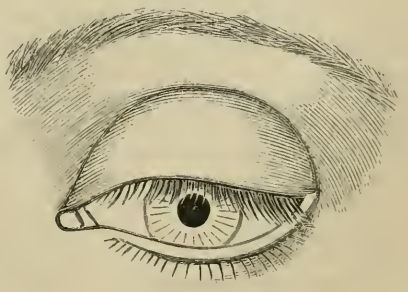


Figure 1. Shows the position of an eye when looking down into the trench, the lower part of the cornea and sclerotic being protected by the lower lid; the position which the eye would have been in as stated by the workmen.

Fig. 2.

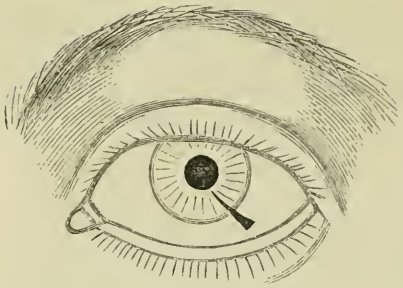


Figure 2. Shows the actual site of the wound in the eye, viz., occupying the lower part of the sclerotic and cornea, and proving that the eye must have been wide open at the time and looking forward; that it must have been wounded from the side, and from below upwards, exactly corresponding to the statement of the child.

The contractors, through their solicitor, communicated with us on the subject, and felt that they could not successfully defend an action. They regretted the circumstance exceedingly, and agreed to give adequate compensation, the amount to be settled by fair arbitration; they proposed, however, to educate the boy and find him a suitable employment when of sufficient age to undertake it, in lieu of pecuniary damages. The parents unfortunately were guided by sordid motives only, and made the child's misfortune a matter of £ *s. d.* for themselves, and requested to have substantial damages. They accepted £100, and the matter was thus brought to a close.

Case II.

The following case of injury to the eye, involving matters of compensation had to be decided by jury, in consequence of the meanness and perverseness of the aggressor. A farmer, tolerably well off, determined to have a day's shooting, and for this purpose he employed a lad to go along one side of the hedge to beat up the birds, whilst he passed along the opposite side and fired at the birds as they rose. After some successful sport, he was expending his last round of small shot, when all of a sudden the boy cried out that he had been hit in the eye. The boy was taken home immediately, and advice procured, and on the following morning was brought to the Ophthalmic Hospital, Moorfields, and placed under our care. There was entire loss of vision, and which was never afterwards regained. On careful examination of the eye, the spot where the shot entered was distinctly visible; it had entered the sclerotic close to the cornea, passed obliquely through the iris, through the lens, and was lost. Effusion of blood into the lower part of the anterior chamber, and cataract were the result, both of which in due time were absorbed; when on opthalmoscopic examination no trace of shot could be found, but detachment of the retina to some extent. The eye was totally blind.

The boy's parents claimed compensation, in consequence of the injury having been caused by negligence, or want of proper caution.

The farmer denied his liability, inasmuch as he considered that the injury was purely accidental, arguing that the shot must have rebounded off a twig

or branch of a tree close by the boy. Nothing would convince him to the contrary, and he preferred leaving matters to be settled in court by a jury. The evidence was very simple, and the case very quickly decided. It was proved that the boy was some distance in advance of the man, and that he was turning round nearly facing the sportsman at the time the gun was discharged; that the line of the shot was in almost a straight direction to the boy's eye, which was further corroborated by the course which the shot took through the organ itself; so that any deflection from any intervening substance would have caused the shot to deviate and not hit the eye. The argument for the defence as to the accident arising from deflection could not be sustained, and the jury awarded 100*l.* damages and costs.

Case III.—Extracted from "Cooper on Injuries of the Eye." (p. 233.)

A farmer sought compensation for injury to one of his eyes. The case is thus described:—Two officers returning from Epsom races were amusing themselves with throwing various missiles at the passers by; one of those missiles, a hollow wooden pear, struck with great force the right eye of the farmer; the sight was immediately extinguished, and the eye much bruised. Ten days afterwards Mr. Dixon was consulted, and an examination with the ophthalmoscope discovered a rent in the retina, and a considerable coagulation of blood, which lay against that membrane.

Legal proceedings were taken against the officers; the farmer in the first instance claiming 2,000*l.* (I am informed), but it was agreed that the amount of compensation should be settled by two arbitrators, founded on a medical report to be sent in by Mr. Dixon and myself, together with Mr. Limms, of Stanies, who had special charge of the case.

We met therefore on the 6th of October, and made a careful examination of the injured eye. The pupil was obliquely dilated and motionless; nothing abnormal visible beyond this; objects were seen by the patient indistinctly, and a black patch obscured the centre portion; pica type was read with difficulty, each word requiring to be separately made out.

The ophthalmoscope showed the seat of the rent in the retina as an opaque, irregular line, nearly in the axis of the vision, and there were many small spots around this, evidently the remains of the coagulum of blood which had not been entirely absorbed.

In our report we were able to state with confidence, that, though Mr. J. might retain a certain amount of sight in the injured organ, we were of opinion that it would never be restored to its former perfection.

The referees awarded 700*l.*, which was accepted with very ill grace.

Part II.

Reviews.

ON THE EMPLOYMENT OF METALLIC AND GLASS SHIELDS IN THE TREATMENT OF SYMBLEPHARON.

By J. C. Wordsworth,

Assistant Surgeon to the Royal London Ophthalmic Hospital.

The American Journal of Medical Sciences for January, 1861, contains a summary of the transactions of the College of Physicians of Philadelphia, wherein is mentioned that Dr. Hayes called the attention of the Fellows to a plan of treatment for the relief of symblepharon, which he had recently employed with satisfactory results. Dr. Hayes states that, "In reflecting on the impunity with which recent experiments had shown that metallic ligatures might be inserted into the tissues, it occurred to him that if, after dividing the adhesions, a metallic plate were introduced between the surfaces, re-union might be prevented without irritation of the eye, resulting from the presence of the metallic substance. In the case cited, a lad of 17, both upper and lower lids were adherent to the ball over a considerable space, and was the result of injury by lime. The lower lid was first operated upon, and after dividing the adhesions, a piece of tinfoil, cut of the proper shape, was then placed between the lid and the ball of the eye, bent over the outside of the lid and the lids closed; a strip of isinglass plaster was applied so as to keep the lids closed and the foil in its place. The foil was removed the next day, and as it did not appear to have produced any irritation a new piece was introduced. This was repeated every day until the surfaces healed. At the end of three weeks a satisfactory result ensued; no adhesion having taken place between the two surfaces. The upper lid was next submitted to the same treatment, but as the tinfoil was too flexible, a thin plate of silver, moulded of the proper shape, was substituted; this, however, was too small, and was displaced by the movements of the eye; the tinfoil was again made use of, but somewhat modified in shape, being cut in a triangular shape, and used in the same manner as that for the lower lid, and at the end of three weeks a successful issue resulted."

The introduction of metallic plates, or of other media, into the palpebral sinuses, for the purpose of preventing union between the opposed surfaces of the palpebral and ocular conjunctivæ in cases of injury or disease of these structures which are apt to terminate in symblepharon, is a practice that has been in considerable operation at the Royal London Ophthalmic Hospital since the days of its eminent surgeon—the late Mr. Tyrrell.

In his excellent practical work on Diseases of the Eye, he has recorded a somewhat unfavourable opinion of the practice. At page 192, Vol. I, he states that in two cases of frænum that had been excised, "I kept a very thin and smooth piece of silver constantly between the eyelid and globe, so as effectually to prevent inosculation of granulations as the surfaces healed. When perfectly healed much good appeared to have been effected; but in less than six months contraction had taken place of the new-formed matter, and fræna were developed as bad as, or worse than, those which I had removed." His successors at the Hospital have not allowed these discouraging remarks to prevent them from giving a more extended trial of the plan thus condemned; and I believe that I am justified in stating that in the practice of most of the surgeons at the present time it is still in operation. My object in writing a few remarks on this subject is principally to describe a modification of the means employed by myself, in common with others, in the substitution of a glass mask, or rather an artificial eye, in the place of the metallic plate.

I am unable to say to whom belongs the merit of this suggestion; but I am certain that it is a decided improvement. It has been adopted at the hospital for several years, and I think I am correct in stating that I have observed its employment by several of my colleagues. It possesses such palpable advantages over the metallic plate, as used by Dr. Hayes, that I imagine it can scarcely be known to our trans-Atlantic confrères, or it would have been employed in the case above quoted. I am, therefore, willing to hope that a few observations on the subject may be acceptable to the readers of the "Reports."

I scarcely need say that it is easy to make glass shells (on the same plan as those of enamel, used for artificial eyes) of various sizes, to fill the palpebral space. Of course, they may be constructed of common glass, and, if desired, can have an aperture of such size as to encircle the cornea, or only sufficient to allow of the passage of the secretions from within. The edge of the shells being round and smooth, and their surfaces free from inequalities, they may be worn with very slight inconvenience, and almost indefinitely. They are easy of application, and may be left to the management of the patient for cleansing and re-insertion. Their exact adaptation to the palpebral space admits of their being used without further appliance; and when once introduced, there is but little risk of their displacement by

the motions of the lids, or by an involuntary act of the patient: the patient and surgeon are therefore saved the trouble of frequent re-adjustment. When in use, too, they do not interfere with the application of water or other means of removing discharges. I need not further dilate on their advantages, but will only add that they afford a uniform amount of resistance, which can be graduated to the necessities of the case, with the greatest precision and effect.

I have myself employed them with the happiest result in the treatment of extensive frænа; and in cases of destruction of the epithelium of the conjunctiva, in which symblepharon was imminent.

It has never occurred to me to have to treat a case of complete, or even of considerable, symblepharon; but from observing the difficulties to be overcome in the successful treatment of large frænа, I should not have great confidence in being able to ensure a very satisfactory result of long duration.

I have noticed that as the healing process progresses, after the division of *broad* and *thick* frænа, that the "masks" were gradually extruded from the bottom of the sinus, in spite of all that I could devise to secure them. I am, therefore, not very sanguine for the ultimate result of the case treated by Dr. Hayes. Immediate union can, no doubt, be obviated by one or other of these means, but as with the contraction of the cicatrices of burns and scalds, we must look to the case for a considerable period before we may take the credit for having afforded enduring relief by any means that we have adopted for the alleviation of these recurring conditions. I fear, too, that we may not venture to draw flattering conclusions as to the result of our efforts in restoring the use of the eye in such cases as symblepharon at the end of a few days or even weeks, but must prolong our tedious observations into months of suspense. Nor may we, unhappily, conclude that if we have done no good, we have at least done no harm; for it unfortunately happens very generally in these refractory cases, that the middle position is denied us, and we are obliged to admit the humiliating conclusion that we have not only failed to effect a cure, but that we have also aggravated the previous condition, and removed the hope of future improvement. For these reasons, I venture to suggest that we are only justified in operating on cases approaching the extremes of the class. The accumulated experience of the classic writers of our own times, and of those who preceded them, all points to this conclusion. The ominous silence of Lawrence, Mackenzie, Dixon, and others, and the questionable suggestions of those who retreat under the cover of untried ideas, leave us but little hope of accomplishing a victory with the means at present within our reach. If, then, we may not reasonably expect success in the treatment of those distressing cases, let us, at any rate, be careful lest we bring opprobrium on surgery through our ministrations.

ON A NEW AND EFFECTUAL CURE FOR ENTROPION AND TRICHIASIS.

By Dr. J. Williams, Cork.

In the "Dublin Hospital Gazette," for January 15th, 1861, Dr. John Williams, Surgeon to the Cork Eye Infirmary, offers some remarks on *a new and effectual cure for entropion and trichiasis*. He states that Cork has gained an unenviable notoriety for inverted lashes and granular lids, and his experience proves that this reputation is unhappily too well deserved—the number of those cases being about sixty per cent. He believes granular lids to be a scrofulous affection and generally confined to the very poorest classes in Cork, hence the value of constitutional as well as local measures in their treatment. The plan of treatment for the radical cure of entropion and trichiasis, proposed by Dr. Williams, is considered by him to be perfectly efficacious and of great value, in those cases which we would desire to save, if possible the natural ciliæ and destroy, those only which by their inversion or misdirection were producing ill effects on the eye-ball.

He states those cases to be,—1st, those cases where whole rows of supernumerary lashes, lie interior to the natural row of ciliæ. 2ndly, those in which a few only, perhaps a single hair of the *natural* lashes are inverted, the others maintaining their normal directions. 3rdly, those, where a few lashes either isolated or in tufts are scattered along the tarsal border. Another advantage in the plan advocated is said to be the preservation of the meibomian glands in most instances.

Dr. Williams has forwarded to us a few further remarks on his steps of this little operation: he says, "in order to simplify it as much as possible, I keep by me a glass stoppered bottle of liquid caustic potash. The sticks of pottasa fusa are made fluid by mere exposure to the air, and having dipped a needle or point of a small knife in the potash, I puncture the tarsal border to the depth of the hair bulbs, attacking each misdirected hair in turn. I purposely abstain from using the term innoculation, as neither pustule, vesicle, nor, in general, inflammation of any moment follows the puncture, which latter may be very minute. If the needle be simply moistened with the potash, and this is sufficient for the puncturing of 2 or 3 hair bulbs, a Demarres ring forceps or horn spatula need not be used, save for the better exposure of distorted lashes; a little cold water is to be applied to the punctures and the operation is completed, the hair bulbs thus being effectually destroyed. It is of the utmost moment that the

patient, if attending the dispensary, be desired to call in a few days, to have the lashes pulled out with a forceps; for, if this be neglected, the misdirected hairs will be firmly maintained, *in situ*, by the contraction of the minute cicatrix of each puncture, which is a burn. I have seen hairs, whose bulbs were effectually destroyed, keep on the tarsal border for months, owing to this neglect. A single trial of this simple operation will suffice to establish the claims I have advanced for its superiority in *all cases* over those already proposed for the cure of trichiasis."

Part III.

Periscope.

CONTRIBUTIONS TO THE KNOWLEDGE OF THE ANOMALIES OF REFRACTION AND ACCOMMODATION, BY F. C. DONDERS.—Archiv. für Ophth. Vol. vi. Part I.

By Mr. J. Soelberg Wells.

The influence of Age on Accommodation and Refraction.

Donders points out the fact that the eye undergoes certain anatomical changes as life advances, and that these changes bring with them certain functional disturbances. Whilst the farthest point of distinct vision does not alter its distance from the eye for a length of time, the near point begins, from about the tenth year, to recede gradually further and further from the eye with increasing years. This recession takes place in all eyes—the emmetropic (normal), the hypermetropic, and the myopic (if the latter remains healthy). This change in the near point is not due to any weakness in the tensor choroideæ, for this muscle remains healthy, but appears to be owing to the lens getting firmer as life advances, for on account of this increased firmness the same muscular action cannot bring about the same change in its form as heretofore.

Gradually a slight diminution of refraction also occurs (the power of accommodation having already decreased considerably), the far point recedes from the eye, and the posterior focal point lies deeper in the eye, or even behind the retina. But this change in the position of the far point shows itself first about the 50th year; at 55 or 60 it has become quite evident in an originally normal eye, so that the latter is now hypermetropic. Donders

thinks that this decrease in refraction is most likely due to the fact that the lamellæ of the lens become more compact during advancing age.

Donders gives some very interesting plates illustrative of the position of the far and near point at different ages in the normal, the myopic, and the hypermetropic eye. In the normal eye the near point begins to recede about the 10th year, and continues to do so, uninterruptedly, even to advanced age. At 45—50 it lies already at 10″—12″ from the eye, and the latter then generally shows all the symptoms of presbyopia. The far point, on the other hand, remains normal till about the 40th year, and then commences slowly to recede, so that the normal eye becomes somewhat hypermetropic about the age of 50, and at 70—80 the hypermetropia may equal $\frac{1}{24}$. Although this hypermetropia is at first only acquired, it may hereafter become absolute, so that the eye cannot accommodate itself even for parallel rays.

The course of the far and near point is, however, far more complicated in the myopic eye. We should always accurately determine and note the degree of myopia, so that we may hereafter be able at once to determine whether it has increased or not. Many consider myopic eyes as particularly strong, but Donders thinks differently, and says, that we are always to regard the myopic eye as diseased. There exists more than a simple anomaly of refraction. "The optical character (of a myopic eye) may consist in this, but the anatomical is a distension of the eye with elongation, particularly of the optic axis, and generally also, although in a less degree, of the other axes. When this extension has arrived at a certain height, the membranes at the posterior pole are so much thinned, and the resistance has decreased to such a degree that the extension cannot here remain stationary, the less so as the pressure of the fluids is generally somewhat increased in a myopic eye. The progression of the myopia, which is a real disease of the eye, is due to this extension."

"From the above we can easily understand that high degrees of myopia do not so readily remain stationary as slight ones; they even continue in advanced years to develope themselves under increasing atrophy. During youth, every myopia is, perhaps, more or less progressive; the progress of the affection is then accompanied by symptoms of irritation, which, according to Von Græfe, may even assume the character of sclerotico-choroiditis posterior. This is the critical period for the myopic eye; if the myopia does not at the same time increase too much it may remain stationary, or at a more advanced age even decrease; if, however, it becomes greatly developed, we shall find it almost impossible hereafter to arrest its progress. At this stage we must therefore avoid everything that may cause determination of blood to the eye, and thereby tend to increase, not only the sclerotico-choroiditis, but also the tension within

the eye. Among these causes we must particularly include working with the head bent forwards. I cannot lay too much stress upon this. Every progressive myopia is threatening to the eye. If it remains progressive the eye will soon become less and less usable (troublesome symptoms at the same time showing themselves), and not unfrequently is irrevocably lost at the age of 50 or 60 (if not even sooner), through detachment of the retina, extravasation, or atrophy and degeneration of the yellow spot."*

Donders has found (he has examined more than 1,500 myopes) that the myopia is generally somewhat progressive; that this is normal between the ages of 15—25; and that the highest degrees of myopia often showed the most considerable increase. He has never seen myopia decrease in youth, or middle age, (except in those rare cases in which the myopia was due to spasm of the muscle of accommodation), even in advanced age it is rare to see a myopia diminish.

Donders gives three plates† illustrative of the course of the far and near point in three categories of myopic eyes.

I. The *Stationary* Myopia.—Although he has called this myopia (equal to $\frac{1}{24}$) stationary, we find that it increases to $\frac{1}{16}$; but this increase is normal during the years of development; and if the increase is not more considerable Donders thinks that we may very well call this myopia stationary (in contradistinction to the progressive). Slight cases of myopia generally belong to this category, they may, however, gradually increase and attain a very high degree, just as an originally considerable myopia may hereafter remain stationary. The former cases we often meet with when the parents have suffered from a considerable short-sightedness; but working with the head bent forwards, and strong convergence of the optic axes, exert a considerable influence upon the increase of myopia. In the most favourable cases the myopia remains quite stationary in manhood; at a more advanced age, it may even decrease somewhat. This apparent decrease is generally due to the diminution of the area of the pupil in old persons, and consequent diminution of the circles of dispersion.

II. *Temporarily increasing Myopia.* — The increase generally takes place between the 15—25 year, and we must consider it fortunate if the myopia becomes stationary before the age of 30. Donders does not consider excessive myopia to be ever congenital except in congenital buphthalmos, nor is he certain whether it is to a certain extent congenital even in hereditary cases. He has too often seen an hereditary myopia which was but moderate at

* Græfe's Archiv. vi, 2, 220. † Archiv. vi, 2, 222.

the age of 12 to 15 (*e. g.* equal to $\frac{1}{16}$). attain a very high degree, perhaps $\frac{1}{4}$ or $\frac{1}{5}$, to be able to deny the possibility of its being completely wanting during infancy. He has seldom, however, seen myopia commencing in emmetropic eyes after the age of 15, never after 20. It progresses the most in those cases in which it is already considerable (perhaps $\frac{1}{8}$), at about the age of 17.

III. *Permanently Progressive Myopia.*—In this class of cases the myopia is already considerably developed at the age of 15, increasing the most to the age of 25 or even 35, more slowly at a later period, but the increase is continual, often however with intervals of apparent non-increase. When the myopia has increased to $\frac{1}{2}$, the worst is to be feared. Seldom, indeed, do we meet with an eye in which the myopia equals $1{\cdot}2\frac{1}{2}$ or even 1·3 which is of any service at the age of 60.

We cannot expect any decrease of such degrees of myopia with advancing years, for the influence of the increasing extension of the eye in the direction of the optic axis is never surpassed, is not even compensated by the altered refraction of the lens. On account of this continually increasing short sight, mouches volantes, scotomata, etc., these patients are exceedingly low spirited and anxious about their eyes. Artificial leeches, derivatives, etc., are found of little or no service, and the most comfort is afforded by cobalt blue glasses, sufficiently concave to render the patient capable to distinguish distant objects.

Donders has also illustrated hypermetropia by three plates.

If the hypermetropia be but slight it is quite latent during childhood, only showing itself about the age of 20, by the fact that slightly convex glasses improve distant vision. At 25, it causes asthenopia, the hypermetropia increasing relatively with the decrease of the range of accommodation; at 35, distinct vision at a distance (with parallel optic axes), has become impossible; and at advanced age, it passes over into absolute hypermetropia.

In a greater degree of hypermetropia no doubt of the affection exists at the age of 20 (asthenopia often even appears before this age). If the affection is still more developed, it is evident, even in childhood,—the child seeing better at a distance with convex glasses. On account of the slight range of accommodation, two kinds of convex glasses may be necessary, even at a youthful age, viz., a weaker pair of spectacles for distant vision, a stronger pair for near objects.

Presbyopia.

In presbyopia the near point is removed too far from the eye, and the range of accommodation is thus gradually diminished

with advancing years, the distinction of minute objects being at the same time rendered proportionably more and more difficult. As, therefore, presbyopia is the normal condition of the normal eye at an advanced period of life, we cannot (Donders thinks), regard it as an anomaly any more than gray hairs or a furrowed skin.

In the normal eye the near point gradually, and without any stoppage, recedes further and further from the eye. This begins, as has been already stated, at about the age of 10, and goes on to advanced age. When are we then to consider that presbyopia really commences? As most persons find some difficulty in permanently working at fine objects, when the near point has receded further than 8″ from the eye, Donders thinks that we should let presbyopia commence as soon as the near point is removed further than 8″ from the eye. It must, however, be pointed out that we not unfrequently meet with persons who experience no inconvenience in reading small print, etc., even although their near point lies at 10″—12″ from the eye.

If we assume Donders' method of letting presbyopia begin when the near point lies more than 8″ from the eye, the reader will be at once struck with the fact that myopic eyes may be at the same time presbyopic. If, for instance, the far point lies at 16″, and the near point at 12 inches from the eye, we have myopia equal to $\frac{1}{16}$, and presbyopia equal to $\frac{1}{24}$, coexisting in the same eye. This cannot, however, occur in excessive cases of myopia (*e. g.* $\frac{1}{5}$ or $\frac{1}{6}$). In hypermetropia we may meet with the same thing. If, for instance, we find that a patient suffering from hypermetropia cannot read with the glasses which neutralize his hypermetropia nearer than 12″—14″, he suffers at the same time from presbyopia, and will require two sets of convex glasses. One pair for seeing objects from 14″ to infinity, and a stronger pair for objects nearer than 14″.

*ON A NEW MODE OF OPERATION IN DESPERATE CASES OF CHRONIC IRITIS AND IRIDO-CYCLITIS. BY PROF. A. v. GRÆFE.**

By Mr. J. Soelberg Wells.

It has been before pointed out by von Græfe ("Archiv," vol. ii, 2) that a methodically repeated iridectomy may even prove successful in those cases of chronic iritis, in which the texture of the iris is greatly degenerated, abnormally vascularized, and beset on

* "Archiv," vol. vi, 2, 97.

its posterior surface with masses of exudation; and, besides this, that a certain degree of atrophy of the eyeball does not preclude the accomplishment of a favourable result. For although the first made artificial pupil generally becomes narrowed, or even closed, the texture of the iris itself improves; on operating again, we generally succeed in obtaining a larger and a permanent pupil, and at the third or fourth time, we not unfrequently arrive at a relative optical result.

In these cases of chronic iritis and irido-choroiditis (as von Græfe points out), there are several circumstances which cloud the prognosis of iridectomy (even though methodically repeated). Amongst these he enumerates—

1st. The degree of the atrophy of the eyeball. He points out the fact that it is not the imperfect tension, *per se*, which is of so much consequence, as the accompanying affection of the vitreous humour, which not only furnishes an optical impediment but threatens detachment of the retina. (H. Müller.)

2. When the perception of light is less than is warranted by the circumstances of the case, for this diminution is then also partly due to some retinal lesion. Thus, it may be dependent upon a collection of fluid beneath the retina, or a destruction of the nervous elements of the latter by the inner contiguous surface of the choroid, or, finally, upon the atrophy of the fibre and ganglion layer, if, namely, excavation of the optic nerve has occurred during a former period of disease, which was accompanied with increase of tension.

3. The condition of the cornea. The latter often loses its optical homogeneousness in these cases, even without the occurrence of any substantial infiltration. Whilst its area diminishes in size, and its curvature becomes flatter, the cornea assumes more and more the appearance of only tolerably transparent cartilage. In slight changes of the cornea we often find, however, that it regains its optical properties when the intraocular pressure re-extends itself to the anterior chamber, and affords a better tension to the cornea.

4. The excessive disorganization of the texture of the iris. We shall always succeed in excising a sufficiently large piece of iris as long as the latter is bulged out in one or more places (like a sail before the wind), being drawn back at the pupillary edge by posterior synechiæ. Von Græfe has before called attention to the fact that it is always fluid which causes the iris to bulge in this manner; when this fluid flows off during the iridectomy, the iris goes back to its original plane. It is not difficult to excise a piece of iris in these cases, for the latter readily forms a fold between the branches of the forceps, and allows itself to be drawn forth.

But the artificial pupil is not generally optically perfect in this class of cases. For we intentionally leave the sphincter, or a portion of it, which is adherent to the capsule, standing; other-

wise (if the adhesions are firm) we may easily cause an iridodialysis or rupture of the zonula* (on the opposite side).

"We, therefore, content ourselves with making a window in the tissue of the iris, which is separated from the natural area of the pupil by the bridge of the sphincter and the masses of exudation united therewith. (Desmarres's Iridorhexis.) Besides this, the newly-gained pupillary opening is occupied, particularly at its inner segment, by larger or smaller remnants of the pigment layer. This has been detached from the tissue of the iris by exudative fluid, and must therefore, by the usual mode of operating, be left standing."

Von Græfe repeats that this class of cases does not, in spite of all this, belong to the unfavourable. Generally, no fresh fluid collects after the operation, and the communication between the anterior and posterior chamber remains perfect. The layer of pigment forms, only exceptionally, a continued optical impediment requiring a fresh operative interference; for the peripheral portion of the pupil is generally quite open, or shows at least open interstices, which suffice for a tolerable amount of vision. There are generally no fresh inflammatory exudations on the posterior surface of the iris. Von Græfe is, in fact, inclined to consider the iritic process as ended in these collections of fluid behind the iris, and to look upon all the further changes in the eye as entirely consequent upon the exclusion of the pupil.

Far different is it in those cases in which, after exclusion of the pupil, no fluid bulges the iris forward, but a continuous web of exuberant ("pouchernde") masses of pigment connect it everywhere with the capsule of the lens. We often see in cases of chronic iritis transitions between the former and latter forms of disease, and the latter then represents the later stage of the affection. "The fluid, which was originally collected behind the iris, becomes absorbed, and together with it the characteristic bulgings disappear, and now the tissue of the iris becomes again intimately matted together with the inflammatorily exuberant pigment layer. But, on the other hand, the last-mentioned condition may also, and without any previous collection of fluid, develope itself directly from the circular posterior synechia,† the iritic process continuing. The tissue of the iris assumes a more stretched, extended appearance, the fibres, however, becoming at

* Von Græfe points out, in a note, that the total posterior synechia, which we meet with in these cases, is not confined alone to the pupillary edge, for the small circle of the iris is generally attached, to the extent of $\frac{1}{2}'''$ or more, to the capsule by masses of pigment.

† Von Græfe says: "I shall henceforth substitute the term 'circular' or 'annular' synechia for that of 'total posterior synechia.' The two former expressions will be synonymous with 'exclusion of the pupil.' The term 'total posterior synechia' is more suitable for that condition, in which the whole posterior surface of the iris is united to the capsule by means of masses of pigment, therefore just for the above last mentioned form of disease."

the same time indistinct, its discolouration depending partly upon a diffuse opacity of the still remaining aqueous humour, and upon the atrophy of the stroma pigment, but chiefly upon the continued admixture of red, as numerous blood-vessels (which are visible with a lens, or even to the naked eye), traverse the iris. It (the discolouration) differs, therefore, very much from that which is seen when fluid is collected behind the iris; in the latter case, the tissue is, on an average, bloodless (with the exception of a few veins) and grayishly discoloured. But the abundant development of vessels depends only partly on an active inflammatory, chiefly on a mechanical, hyperæmia, inasmuch as the venous reflux is much impeded (on account of the exuberance of the pigment on the posterior surface), or the accompanying affection of the ciliary region.

"In these cases the iris is also generally pushed forward, and the anterior chamber reduced to a minimum. But here, in contradistinction to the other class of cases, the bulging forwards is not partial but total, the pupillary edge not being umbilically drawn back. For whilst such an iris, and most likely even the ciliary processes allow but little aqueous humour to transude, the lenticular system and the therewith connected surface of the iris (yielding to the intraocular pressure) advances towards the cornea. Finally, we cannot look upon the process of chronic iritis as in any way extinguished, there is present a continual inflammatory exuberance on the posterior surface which extends itself to the ciliary processes, and whose duration is quite uncertain."

Now, although we may in such cases occasionally see some benefit arising from an iridectomy, this is almost always only exceptionally the case. As we cannot get a fold of the iris between the branches of the forceps, at all events during the first operation, it must be picked away piecemeal, during which there is a great deal of bleeding, owing to the abundant vascularization, and the slight intra-ocular tension. The worst is, however, that the chronic state of irritation is not extinguished by the iridectomy, and the texture of the iris not improved. The reason is that we have an inflammatorily exuberant, pigmented tissue behind the iris, and that we even irritate this afresh by the operation. For the same reason we do not gain anything optically by repeating the iridectomy, the already commenced atrophy of the eyeball increases more and more, and the condition of the eye becomes at last almost hopeless.

In attempting to benefit such cases of irido-cyclitis it is therefore necessary not only to remove the iris, but also the masses of exudation which lie behind it. But we cannot succeed in this by means of the common iridectomy, for the iris does not fold, but comes away piecemeal. Von Græfe thinks the straight hook forceps best for getting away such an iris; with this he has often succeeded in bringing away large tags of membrane which

adhered to the posterior surface of the iris. If we have once succeeded in making a hole in the masses of exudation (even although it close again afterwards) we have gained something for the next operation. But their removal is often impossible, if we do not employ an amount of force which would endanger the lens. Now Von Græfe had an opportunity of observing that these membranes could be removed with comparative ease when no lens was present.

A woman came to him in 1858, from whose left eye he had extracted a cataract two years previously. This eye now presented a most ominous appearance; moderate atrophy of the eyeball, the iris stretched, its fibrous tissue very much obliterated, numerous vessels giving it a reddishly-yellow colour, local sensibility of the ciliary region, the pupil closed by an opaque membrane the perception of light was very good, the fixation inexact, but yet evident in all directions. Von Græfe performed iridectomy and was surprised at the comparative ease with which he gained a good-sized opening in the masses of exudation. The optical result was very satisfactory, for the patient was enabled to read largish print, and find her way about. He operated upon two analogous cases in 1858.

He also saw, in anatomical preparations, that it was almost impossible to remove extensive inflammatorily exuberant masses of pigment without endangering the lens. The adhering surfaces are too extensive, and the brittleness of the anterior capsule too great to warrant the expectation of a favourable solution of the difficulties.

He also thinks that the pressed forward lenticular system, crowded against the posterior surface of the iris, exerts, in some cases at least, a directly injurious influence upon the inflammatory process. But when there are extensive adhesions with the posterior surface of the iris, he thinks that the lenticular system has not only a passive signification, for an exchange of material evidently takes place, through the caspule of the lens, between the exuberant pigment layer and the layer of the intracapsular cells. It has long been a well known fact, and was first pointed out histologically by von Græfe himself, that in every extensive process of deposit on the anterior surface of the capsule, the corresponding region of the intracapsular cells at once becomes diseased, and that certain forms of intracapsular opacities in iritis, and also capsular cataracts which may partly disappear again, depend upon this.

"Supported by these reasons and this experience, I have determined to remove the lenticular system, in those cases of chronic iritis and irido-cyclitis, in which extensive formation of pigment masses occurs at the posterior surface of the iris, and only after such a removal to endeavour the withdrawal of the iris together with the exudation membranes."

Von Græfe does not find the linear incision suitable for the

extraction of the lens in this case, as the complete removal of the lens is of great consequence, for portions of lenticular substance remaining behind might easily cause great irritation. He finds it better therefore to have recourse to the flap operation.*

He makes the flap, if the condition of the cornea permits it, downwards, avoiding, if possible, to wound the iris; but if the latter is greatly bulged forward, he passes the knife boldly through it, and in the latter case the capsule is already sufficiently divided to permit the ready egress of the lens. If this is not the case, or the iris has remained untouched, he introduces a pair of straight forceps, or a hook, and removes or tears as much of the iris and membrane as is necessary to permit the exit of the lens. After the operation a compress is to be applied, firm at first, and then afterwards somewhat looser. There is generally only very slight reaction, so that the patients mostly only want to remain in bed for a day or two, and 5—7 days in a darkened room.

In some of the cases the condition of the iris begins to improve after the lens has been removed. The anterior chamber becomes wider, and some patients had a little better perception of light, in others it remained in statuo quo. In many cases the ciliary neurosis was also much diminished. For bleeding into the anterior chamber a soft compress is best, sometimes the absorption of the blood may take as long as 2—3 weeks.

A month or six months after the extraction the iridectomy is to be made. He makes a large linear incision, passes a large sharply-pointed hook perpendicularly through the tract of the membranes. If on traction of the hook a clear black pupil of middling size becomes apparent, and vitreous humour penetrates into the anterior chamber, he considers the dilaceration as sufficient. If this is not the case, a blunt hook or a straight pair of forceps should be introduced, and the opening enlarged. The same will be necessary if a secondary cataract appears in the newly-made pupil. After this operation the cornea becomes plumper, and may re-acquire a good amount of curvature.

At first, he was afraid that the pupils might in such cases close again, but this is fortunately not the case, and these cases form in this respect a most striking exception to those in which an iridectomy has been made without the previous removal of the lens. He reports two cases in which the results of the proceeding were remarkably good.

* This might with justice be deemed a very dangerous proceeding in such diseased eyes, but v. Græfe has noticed the curious and interesting fact that the danger of the flap incision is less in eyes suffering from irido-cyclitis, and more or less atrophic, than in normal eyes.

Part IV.

Minor Contributions, etc.

CASE OF IRIDO-CHOROIDITIS, ILLUSTRATIVE OF THE BENEFICIAL EFFECT OF REPEATED IRIDECTOMIES.

REPORTED BY

Mr. J. Soelberg Wells.

Wm. Waters, æt. 28, was admitted an in-patient of the Royal London Ophthalmic Hospital, under Mr. Bowman, Feb. 12, 1861.

About twelve years ago, he was kicked in the right eye by a lamb, the injury was followed by almost total loss of sight from irido-choroiditis, which he allowed to run its course without subjecting himself to any medical treatment. The injured eye acquired an outward squint.

Two years ago, he was unfortunate enough to get some cement into the left eye; irido-choroiditis ensued, and, in spite of every effort on the part of his medical attendants, the sight of this eye was all but lost. He was thus quite unfitted to gain his livelihood; indeed, could hardly find his way about the room.

On his admission at Moorfields, the eyes were as follows:—

Feb. 12.—*Right eye* somewhat harder than it should be. Sclerotic bluish and somewhat thinned, but nowhere bulging. Cornea nebulous, particularly outwards, and upwards, and inwards. Elsewhere, though apparently transparent, oblique illumination showed a diffuse cloudiness. Iris bulged forwards and slightly adherent to cornea at the nebulous outer, and upper, and inner portions. Pupil vertically oblong, totally adherent, and occupied by thin, reddish, false membrane.

Field of vision. Upwards and outwards, much contracted; downwards and inwards, almost normal.

Vision. Counts figures within 18 inches, distinguishes letters of No. 20 (Jäger) with difficulty.

Left eye rather soft. Slight vascular zone around the cornea, which is somewhat clouded except above and below. Sclerotic bluish. Iris bulging forwards, and adherent to the cornea to a small extent at inner and lower portion. Margin of pupil adherent to capsule. Area of pupil partially covered by false membrane.

Field of vision. Completely contracted, upwards and inwards; somewhat narrowed, outwards and downwards.

Vision. Counts figures with some uncertainty within 3 feet.

On the same day Mr. Bowman made an iridectomy in both eyes.

R. eye. The iridectomy was made downwards and slightly inwards. At the first attempt to get the iris away the marginal portion of the pupil remained adherent to the capsule, but came away after a gentle pull, leaving a good-sized, apparently clear pupil.

L. eye. Iridectomy of about one-sixth of the iris, upwards and slightly inwards.

February 15.—Going on well; has had but very little pain.

February 19.—The pupil in the r. eye appears clear; this eye is quiet. In the l. there is a good deal of injection upwards.

February 22.—R. eye quiet, a little pain every now and then. Sees letters of No. 19, but does not to-day see quite so clearly, he says, as he has done within the last day or two. On oblique illumination the artificial pupil is now seen to be not clear, for though the iris appeared to have been entirely excised, the uveal pigment has been left behind (Fig. 1, *b*), and covers almost the whole of that portion of the lens which has been exposed by the iridectomy, giving it a light coffee colour. The artificial pupil is only clear at the extreme lower portion (*c*.)

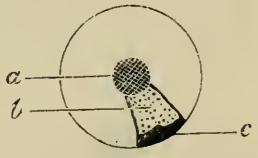
Fig. 1. R. eye.*

Fig. 1.

a. Original pupil crossed by false membrane.

b. Uvea remaining adherent to capsule.

c. Clear portion of pupil.



L. eye. Still a good deal of injection, but no pain. Counts fingers up to 4 feet. Can see the hands of a watch, but cannot tell the time. The iris has in both eyes receded to its natural plane, ceasing to bulge, except of course where it is adherent to cornea. On oblique illumination the left artificial pupil is seen to be almost completely filled by an old false membrane (Fig. 2, *b*), the only clear part being upwards and inwards (*c*.)

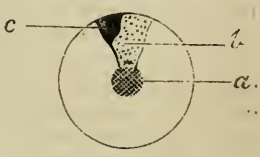
Fig. 2. L. eye.

Fig. 2.

a. Natural pupil occluded by false membrane.

b. Artificial pupil partially filled by grey false membrane.

c. Clear portion of artificial pupil.



As the vision of the right eye was already improved, even

* These figures are intentionally made diagrammatic.

although only the lower portion of the artificial pupil was clear, Mr. Bowman determined to try if he could not remove some of the uvea from the capsule.

He accordingly on February 22nd made a small incision with a broad needle in the upper and outer margin of the cornea, through which he passed a spatula, and with a gentle scraping movement tried to remove portions of the uvea. Not, however, appearing to succeed in this, he enlarged the incision with an iridectomy knife, and made an iridectomy upwards.

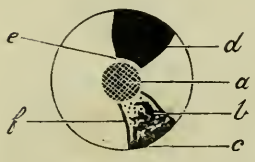
Feb. 25.—No pain in r. eye.

Feb. 28.—R. eye, tells time by watch and letters of No. 16.

March 5.—On oblique illumination the last made artificial pupil (upwards) is seen to be clear (Fig. 3, *d*), the pupillary margin remains adherent to the lens at (*e*), the false membrane and uveal pigment continue to obstruct the original pupil (*a*) as well as that made by the former iridectomy downwards (*b*). On looking under the outer margin (*f*) of this lower pupil it is interesting to observe by oblique illumination that there is a considerable space between the iris and uveal pigment, the two layers parting at the margin of the original pupil, the uvea following the surface of the lens to near its margin, while the true iris tissue lies considerably in front of it. Upon turning the patient's eye very much to the right we can actually see into the clear aqueous space between the iris and the plate of uvea.

Fig. 3. R. eye.

Fig. 3.



a. Original pupil filled by false membrane.
b. First iridectomy, the space occupied by uvea and false membrane.
c. Clear marginal pupil.
d. Clear upper pupil.
e. Portion of the original pupillary margin adherent to lens opposite to upper iridectomy.
f. The outer margin of the lower iridectomy behind which we can see the space between iris and uvea.

It is fortunate, indeed, for the patient, that there is no membrane or uvea adherent to the capsule in the part exposed by the last made iridectomy in the r. eye, and that the pupil upwards is thus quite clear. His vision is wonderfully improved, for he now reads No. 6 fluently and makes out letters of No. 4 !

The tension of the r. globe has become natural.

As the left eye was not improved, particularly as to sight, and as the artificial pupil formed in it proved to be almost as much blocked up with greyish false membrane as the original pupil, Mr. Bowman determined to make a pupil in another situation. This was done by an iridectomy to the outer side, this day (March 5th).

March 7.—L. eye quiet, no pain, wound uniting, new pupil apparently clear.

March 8.—With the oblique illumination the new pupil is seen to be filled up by a reddish mass (blood and lymph). Vision not improved.

March 12.—L. eye. Mr. Bowman made another iridectomy outwards, so as to enlarge the pupil already formed.

March 15.—Eye quiet, no pain. Pupil not clear, for the uvea has been left on the lens; at the outer portion there is a small rim of clear pupil.

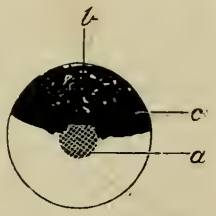
He counts fingers with this eye at $5\frac{1}{2}$ feet.

Mr. Bowman now determined to try the possibility of detaching the pigment layer from the lens. He accordingly made an incision with a curved iridectomy knife at the upper and inner margin of the cornea, and passed a bent aluminium hook through this incision into the anterior chamber; he then advanced the hook towards that small marginal portion of the artificial pupil which has been mentioned as being clear, and gently tore through the pigment layer (from its outer edge towards the centre of the pupil), and excised this with another small portion of the iris. There was slight bleeding, and a compress was ordered to be placed on the eye.

March 22.—On oblique illumination, much of the left pupil is seen to be clear; the lens does not appear to have been injured by scraping off the uvea. Vision improved; he reads No. 20 fluently, and counts fingers at 9 feet.

March 26.—Left eye quiet. The upper half of iris has now been nearly all removed (Fig. 4). Reads words of No. 16.

Fig. 4.



a. Original pupil filled with false membrane.

b, c. Large pupil resulting from the successive excisions of the iris. At *c* the uvea has been completely cleared; at *b* some of it remains.

R. eye reads letters of No. 2.

Now, however, that the sight of both eyes is restored, the patient expresses a new kind of trouble, viz., double vision, depending on the divergent squint which has been already stated, to have followed the loss of the right eye twelve years ago. Since the right eye has improved so wonderfully, he has used this eye for vision, and the left eye now diverges $2\frac{1}{2}$ lines. With a view of remedying this annoyance, Mr. Bowman divided both external recti sub-conjunctivally.

April 2.—No diplopia when looking at objects in front of him within 8 feet distance. Beyond this distance a slight inversion of the left eye occurs, and slight diplopia. When an object,

8 feet in front of the eyes, is moved to the side, it continues to be seen single till its distance from the middle line reaches about 4 feet; then the insufficiency of the corresponding external rectus gives rise to a convergent squint and homonymous diplopia.

April 5.—Goes home to-day. Is but very little troubled with diplopia, and that only when looking very far to either side. The tension of both eyes normal. The field of vision of the right eye normal, of the left a little narrowed upwards. R. eye reads No. 4 fluently, can read No. 2. L. eye reads No. 12. The fundus of each eye, examined by the ophthalmoscope through the new pupils, seems natural, but it is seen hazily through a fine, almost general, opacity of the cornea. The vitreous body is also somewhat clouded.

P. S.—June 18.—I have just received a letter from the patient (William Waters), *written by himself*, in which he states that he has been at work for the last six weeks, that he can read a word or two of No. 1 with the right eye, and can read No. 2 very nicely for a short time. His left eye is still weak.

A CASE OF PULSATING TUMOUR OF THE ORBIT, FOR WHICH THE COMMON CAROTID ARTERY WAS TIED.

Reported by Mr. Francis Mason.

S. L., aged 41, residing at Hillingdon, near Uxbridge, was admitted into King's College Hospital, under the care of Mr. Bowman, on April 13th, 1860. The patient is a plethoric, but healthy-looking woman, married, and has six children. She states that she had always enjoyed good health until two days after Christmas, 1859, when, as she was in the act of washing some linen, she felt a sudden acute pain on the right side of her head, and from that time she has had an unremitting "noise in the head," which, she says, sounds like "the puffing of a steam-engine when at work." The right eyeball gradually became enlarged and protruded from its socket. She was at this time six months pregnant. Natural labour came on in due time, and she was delivered of a healthy child about a month ago. She has continued in much the same condition up to the date of her admission into the Hospital, attending to her ordinary household duties as well as she was able.

Present Condition.—The patient complains of feeling languid, and of having a severe headache; she cannot stand up for more than five minutes without becoming giddy. The conjunctiva of the right eye is very red and œdematous. The globe of the eye protrudes and fills up the hollow beneath the brow. The eye is

amblyopic; she can tell the time by a watch at the distance of 14 inches. There is complete paralysis of the right external rectus, and she has a convergent squint. On pressing the fingers against the eyeball, or beneath the margin of the orbit, a faint and obscure pulsation may be felt. The veins of the upper lid are varicose. The supra-orbital artery may be felt to beat naturally. On applying the stethoscope upon the front of the eyeball, a loud blowing murmur synchronous with the radial pulse is heard. The same, but more subdued, sound may be detected over the whole of the right side of the head and face, and to a fainter degree on the left side. By compressing the common carotid artery the sound is diminished in intensity, but is not altogether arrested. The heart sounds are quite natural, and there is no family history of cardiac disease. Ordered nourishing diet and a mixture of nitric acid and bark three times a-day.

April 18.—In the same condition. Mr. Bowman ordered digital compression of the common carotid artery to be maintained continuously, for five minutes, three times in the day.

April 26.—The pressure of the vessel does not appear to have benefited the patient in the least degree. There is neither giddiness, faintness, nor any other urgent symptom produced by the digital compression. General health of the patient much as usual.

April 28.—Patient much the same; digital compression to be maintained, for 10 minutes, three times daily.

May 3.—No improvement. The compression has been maintained for the greater part of the last two days. As the case did not seem to make satisfactory progress, and the temperature was higher than that of the opposite side by 3° and 4° F., it was determined to irrigate the eye, for which purpose an apparatus has been contrived, consisting of a small tank containing water, which is placed above the level of the patient's head as she lies in bed; to this tank is attached a flexible tube, at the extremity of which is a stopcock to regulate the flow of water; this is allowed to rest on the patient's forehead in such position as that the water shall drop on to a piece of lint placed over the eyelid, in order to direct and diffuse the fluid: the waste water being received into a cup made of gutta percha, accurately moulded to the cheek, is conveyed by a connecting tube to an adjacent vessel. This plan of treatment was practised for one hour three times during the day.

May 8.—The patient expresses herself as much relieved by the irrigation. She sleeps at night better than she has hitherto done. General health continues good. The right eye is, on the whole, less turgid. The bruit is heard very loudly over this eye, less so over the left, and even less over the forehead either on the right or left side than on the cheek. The irrigation to be maintained continuously throughout the day.

May 14.—She has been much better until to-day, when the throbbing recurred with increased severity. She finds the con-

strained position in which she lies very irksome. Face seems more congested than usual. P. 120 full. Mr. Bowman bled her from the arm to ʒviij.

May 15.—Is decidedly improved, having enjoyed a better night's rest than she has done since Christmas. She thinks the noise is less. Eye is less turgid; p. 120, much softer; tongue clean; appetite good; bowels open. Irrigation to be discontinued. Lint, dipped in cold water, to be applied to the eye.

June 1.—Has been much the same up to this date. Feels very ill this morning. Eye much congested; the throbbing much increased. Has not slept well; appetite falling off. P. 104, very weak. The irrigation to be recommenced, at her own request.

June 6.—Expresses herself as being in less pain; the distress arising from the noise in the head not nearly so great. Pulsation in the eyeball hardly perceptible to the finger; bruit less strong.

June 16.—Complains of severe pain and of soreness in the eye, which commenced a few days ago, but became greatly aggravated last night. Eye much swelled and œdematous; conjunctiva very vascular and turgid. She has a headache, cannot completely close the eye, on account of the swelling; movement of the globe of the eye gives great pain. Mr. Bowman determined to ligature the common carotid artery of the right side. The patient having been narcotized, the usual operation was performed, and the vessel secured above the omohyoid muscle. Two small arteries in front of the sheath had to be tied. The jugular vein overlapped the artery to an unusual extent; so did the thyroid body on the inner side. On the ligature being made tight, the bruit ceased, and the eye somewhat receded.

7·30 p.m.—She is quite comfortable; says the blowing sound in the head is still present, but to an extremely feeble degree. Has vomited thrice since the operation. P. 120.

June 17.—Has had three or four hours' good sleep. There is some retching and feeling of sickness. Says she feels much relieved by the operation; there is no throbbing. The eye is less prominent; veins less congested; right side of face redder and of a higher temperature than the left. The stethoscope applied to the right eye, detects a slight bruit; the same sound is heard, but more faintly, over the left eye. The sight of the right eye rather improved since the operation. P. 124, rather weak.

June 18.—Does not sleep for more than ten minutes at a time. Takes beef-tea and ʒiv of brandy daily. Bowels moved naturally. Temperature of right cheek, inside the mouth, 101°F.; of left cheek, 99°F.

June 19.—Feels much better, having had a good night's rest. She says the noise has entirely ceased, and she is quite free from pain. The wound discharges a little bloody serum. Wound dressed, which has made the patient more comfortable. Water dressing applied.

June 20.—Discharge healthy, Temperature of right cheek, inside the mouth, 99⅞°F.; left cheek, 99⅛°F.

June 22.—Is going on well; wound healthy, dressed with myrrh lotion. Pain and tenderness in neck much diminished. Eye much less congested; squint not so marked. Patient rather weak, p. 108. Ordered an enema of 10 grains of quinine in beef-tea.—She takes ʒx of brandy daily.

June 26.—This morning, about 4 a.m., whilst using the bed-pan, a gush of arterial blood (about ʒij), took place from the wound in the neck. The hæmorrhage was immediately arrested by pressure (the patient having been watched by the dressers night and day since the operation).

June 27.—Does not seem to have suffered in any way from the hæmorrhage which took place yesterday morning. She slept well last night, although another slight hæmorrhage occurred at 9 P.M., which was arrested by pressure. Repeat the quinine enema.

June 28.—Wound looks very healthy and is rapidly granulating. Eats, drinks, and sleeps well. P. 100, rather weak. The bruit may be heard more distinctly, and there is increased vascularity of the eyeball.

June 30.—Ligatures from small vessels came away to-day. P. 100, general condition much the same. Yesterday afternoon slight oozing of blood (about ʒss) from the wound.

July 4.—This morning the ligature from the carotid came away with the dressings (18th day after operation). Discharge healthy. The vein running across the upper eye-lid remains turgid, and a faint bruit may be detected with the stethoscope.

July 6.—There was a slight oozing of blood from the wound last night. Going on well.

August 2.—The patient has been making rapid progress since the last report, the bruit only being noticed by her when the circulation is from any cause hurried.

August 3.—At 7 A.M. there was sudden arterial hæmorrhage, to the amount of perhaps ʒij. This was arrested by pressure. At 4 P.M. a little bleeding again took place. P. 128, weak. She starts in her sleep and mutters. The eye much enlarged and more prominent since the morning. There is chemosis between the lower lid and eyeball. She is distressed by the noise in the head, and the bruit may be easily heard with the stethoscope.

August 4.—Slight hæmorrhage again last evening between 9 and 10 o'clock. P. 104, much stronger. Eye less prominent, but veins much congested. Enema of quinine to be repeated daily.

August 13.—Progressing favourably. Discharge from wound of a healthy character. To discontinue the quinine enema.

August 19.—This morning the eye is more prominent; there is great chemosis. Patient extremely low spirited about her condition. She did not sleep so well as usual last night.

August 20.—The eye is much more œdematous, and she has been very sick, bringing a quantity of glairy viscid material from the stomach. She does not recognize those around her. P. 130, very weak. At 4 P.M. the vomiting recurred, following by shivering and some loss of consciousness, which lasted about ¼ of an hour.

August 21.—About 11 P.M. last night she was almost pulseless, and extremities became cold. She was supplied with brandy, and in about half-an-hour she rallied, and slept at intervals for about ten minutes through the night. Mr. Bowman ordered six leeches to be applied round the eye.

August 22.—She does not suffer so much pain in the region of the eye as she did before the application of the leeches. The eye still protrudes very much, and the side of the face is much swollen.

August 23.—Slept nearly all night, having taken an opiate; is more conscious to-day. Complains of throbbing in the eye. The quinine enema to be repeated daily. Cotton wool soaked in hot water to be constantly applied to the eye.

August 29.—Has been improving since the last note. To-day she feels more composed, and is in better spirits. Takes her food well, and sleeps well with an opiate every night.

Sept. 4.—The upper lid can be more easily moved. The pain very trifling in the eye. She does not seem to be losing flesh to any great extent.

Sept. 18.—For about a week some small nodular swellings have become perceptible to the touch below the supra-orbital ridge, projecting near the upper wall of the orbit. There are three or four of these. They are elastic, and pulsate very decidedly when touched; they seem also distinct from one another, or if they have a common connection it is in the depth of the orbit. The innermost one is above the tendo occuli. It is like a pea, very distinct from the rest, and pulsates most. It is doubtful whether there be not some swellings within the lower wall of the orbit. The eyeball is hard and more prominent; pupil dilated; no sight; no glandular enlargement in the neck. She is in constant pain, and sleeps little, even with morphia. The lids are less tense. The pulsation ceases on compressing the left carotid. A faint soft bruit is heard over the orbit. Tongue clean. She is much weaker.

Diagnosis. Probably malignant growth, or perhaps dilated and distended veins with propagated pulsation.

October 2.—Has a good deal of pain at times in the eye, but patient altogether improving slowly.

October 25.—Has been much the same since last report, but she is much stronger and better in health; eats well, but cannot sleep without the morphia. The small pulsating nodules below the brow are just as before. Ordered to be discharged and to go in the country, and readmitted if necessary.

P.S.—Mr. Mason having written to the patient to inquire her present state of health, received the following reply. "June 7, 1861. I feel great pleasure in informing you that I have greatly improved since I left the hospital, and I am happy to say that I am able to follow my occupation at home more than I ever expected I should be able to do. * * * * * I have quite lost the sight of my eye, but the swelling is gone down, and it is much smaller than it was when I left the hospital." * * *

CASES OF SOFT CATARACT, TREATED BY GIBSON'S OPERATION, WITH REMARKS.

By J. W. Hulke.

The extraction of soft cataract through a small opening in the cornea, described fifty years ago by Gibson, in his "Remarks on the extraction of Soft Cataracts," and long in disuse in this country, was revived in an improved form in 1851, by Mr. Bowman, at the Royal London Ophthalmic Hospital.

Gibson gives, as the principal points, in a chapter "On the mode of Extracting a Soft Cataract through a puncture in the Cornea," 1st, the reduction of the opaque lens to a pulp, and 2ndly, the evacuation of this through a limited corneal wound. He says, "It should be the aim of the operator to rupture, most freely, the anterior part of the capsule, and to break down the substance of the cataract, by passing the couching-needle cautiously through it in different directions, that the aqueous humour may more readily act upon it, and reduce it to a pulpy state." The "flocculent and unequal surface" of the cataract, denotes its fitness for removal, and this proceeding he describes in the following words: "The cornea-knife, (Ware's), of the largest size, is then to be introduced through the cornea, towards the outer angle of the eye, at the usual distance from the sclerotic coat. If there should be any doubt of the free laceration of the anterior part of the capsule of the lens, the point of the cornea-knife should be directed obliquely through the pupil, so as to make a more free division of it. All pressure upon the eyeball must now be carefully avoided, and the cornea-knife gradually withdrawn, which is attended with the evacuation of part of the aqueous humour and some portion of the cataract.

The curette is next to be introduced through the incision, and advanced towards the pupil, by which the whole of the cataract may commonly be removed by degrees, in a pulpy state, so as to render the pupil perfectly clear."

He proceeded to the second operation "as soon as the irritation produced by the couching had subsided," and when this was only slight, says, "the puncture of the cornea may be performed in two or three weeks."

The operation now practised at Moorfields is essentially Gibson's, with these improvements:—in using the needle great care is taken to avoid injuring the posterior capsule (which Gibson thought was always torn), and the pupil is fully dilated with atropine before and after this preliminary measure; for unless the pupil be widely dilated at the time the needle is used, the lens is not sufficiently under the operator's view; and afterwards, when the lenticular substance swells, the probability of irritation and inflammation is much lessened by keeping the iris out of the way of direct pressure at the periphery of the chamber. The importance of sparing the posterior capsule is seen during the evacuation of the pulp of the softened lens; for if it has been torn, and the hyaloid fossa ruptured, the vitreous humour comes forwards through the rent, and embarrasses the operator by pressing portions of the lens aside behind the iris. The chance of prolapse of the iris is much diminished by making the corneal wound,—which should be large enough to give free passage to the curette (two lines and a-half will be generally sufficient)—a short distance inside the border of the cornea, and not at its junction with the sclerotic.

Case I.—Congenital Cataract.

A. L., æt. 25, of healthy appearance, was admitted into the Royal London Ophthalmic Hospital, May 10th, 1859, with congenital cataract. He had always supposed himself to be short-sighted. He had been brought up a carpenter, and with his back to the light, managed to work, and also to read large type; but he could not recognize the features of persons at the distance of a few yards, as across a street. The external appearance of both eyes was healthy; the pupils were active; the right iris was slightly tremulous. The lenses presented very symmetrical opacities: in each there was a small milky nucleus, with streaks radiating from it; the margin of each lens was quite transparent. When he understood the nature of his case, and learnt that the removal of the cataracts and the use of proper glasses offered him a good prospect of seeing better to do his work, and of reading small print, he was very anxious to be operated on. I performed Gibson's operation in the right eye. Slight iritis ensued, and a secondary capsular opacity resulted. This I slit in several directions with a cannula scissors, and obtained a clear, circular, central, active pupil. With a convex lens, he could read small print, and when I saw him again, twelve months afterwards, he continued to be highly satisfied with the result.

Case II.—Congenital Cataract.

M. H., æt. 7, a delicate boy, was brought by his father to the Royal London Ophthalmic Hospital, May 4th, 1860, to see if anything could be done to improve his short-sight. It was at once apparent that he had congenital cataract. The lenticular opacities were symmetrical; in each lens the nucleus was greyish, and the margin marked with closely crowded stria. At 2½ inches distance he spelt No. 19, with pains and hesitation. Extraction through a small opening was performed in both eyes; a week being allowed to pass between the comminution of the lens and its subsequent removal. Chloroform was given on both occasions, and the second time caused very troublesome sickness, which lasted nearly two days. After the removal of the lens from the left eye, whilst vomiting, a small bead of vitreous humour was squeezed through the corneal wound; as I had taken care to avoid injuring

the posterior capsule, probably the straining had burst the suspensory ligament. Slight inflammation ensued. In the right eye, a circular, central pupil was obtained; in the left, a pear-shaped one, the lesser end drawn towards the scar of the corneal wound; and in each eye, a milky band, about one-eighteenth of an inch wide, stretched between the pupil and the corneal scar. These bands and some opaque capsule were broken through with two needles some months afterwards, and, with glasses, the boy read No. 8 type. I found that this boy's father had congenital cataracts; one had been removed by solution.

In both these cases, the imperfection caused by the lenticular opacity, had been mistaken for short-sight; by no means an uncommon mistake, and one which even medical practitioners not very familiar with eye diseases have sometimes fallen into. In the first case, the opacity was so limited, and the periphery of the lens so clear, that had iridodesis been then known, I should certainly have practised it. The slight inflammation which occurred in both cases, is, I think, mainly attributable to the insufficient use of atropine.

Case III.—(Non-Congenital) Cataract in a young boy.

Wm. R., æt. 9, an active, healthy boy, was admitted into the Royal London Ophthalmic Hospital, February 3rd, 1860, with cataract in one eye. The nucleus and the back of the lens were pearly and glistening; whilst the front and the margin were nearly transparent, with only a few stria. The pupil was active and the perception of light good. The other eye was quite healthy. The pupil having been widely dilated with atropine, and chloroform having been given, I tore open the central region of the anterior capsule with a fine needle, and broke up the lens, taking care not to push the point so deep as to injure the posterior capsule. After this, atropine was dropped into the eye twice a day. 7th. The whole lens was milky white; some small pieces had fallen into the anterior chamber; there was slight ciliary pinkness. 10th. The softened lenticular matter was removed through a small incision at the outer side of the cornea, a little, however, remained fringing the black pupil. March 6th. A clear, circular, central pupil. The ciliary redness had disappeared. With a + 2½ lens the boy read No. 10.

Case IV.—(Non-Congenital) Cataract in a young boy.

J. M., æt. 9, a sturdy little peasant boy, was sent to the Royal London Ophthalmic Hospital, March 1, 1860, with cataract in the left eye, which was first noticed by his mother two years before. The appearance was remarkable. The lens was dark greyish brown, with small glistening buff-coloured specks scattered through it. The pupil was active, and the perception of light, good. The lens was freely comminuted in the same manner, and with the same precautions as in the preceding cases. It had a medium consistence, and when broken up formed a chocolate-brown mass. A drop of atropine was put into the eye twice daily. The chloroform produced sickness, which continued during the next day, when the eye became congested and painful. The pain and redness were relieved by leeching, and the sickness ceased. 13th. The anterior chamber was filled with the swollen lenticular matter, a chocolate brown pulp, which I now removed through a small corneal wound. This was followed by slight reaction, which subsided on the 20th. 27th. The posterior capsule was observed to be covered with a thin film. He distinguished large objects, and was made an out-patient. August 7th. He was readmitted into the house. The posterior capsule was opaque, and a slender whiteish band stretched from the pupil to the scar of the corneal wound. This band and the opaque capsule were torn through with a couple of needles, and on the 14th, the boy was sent home, reading No. 16 with + 2½ inch lens.

Case V.—Traumatic Cataract.

W. A., æt. 17, had been struck by a splinter of a gun-cap in the centre of the cornea, which had left a linear scar opposite the pupil, and had cut a small flap in the centre of the anterior capsule of the lens, that projected through the pupil into the anterior chamber, and vibrated when the globe was moved. The lens was swollen, and milky white. I extracted it through a corneal wound of about 2½ lines, and one week afterwards the lad went home into the country. The pupil was clear, active, and central, and he read No. 8 with a 2½ inch convex lens.

CASES ILLUSTRATING VARIOUS FORMS OF MUTILATION OF THE FIELD OF VISION.

By J. W. Hulke.

I first learnt the importance of ascertaining the condition of the field of vision, from a paper by D. A. von Graefe, A. F. O., vol ii, part 2, p. 258, 1856, in which it was shown to be a valuable aid in diagnosis. I have since frequently mapped out the field of vision in amblyopic cases, some of which I now publish, hoping to attract attention to this interesting subject.

The proceeding is very simple, the patient stands before a large black board, at a short distance from it; this distance should in all cases be uniform, in order that maps taken at different times, or of different cases, may be comparable. I used to place my patients 12 inches from the board, but I now find 8 a more convenient distance. Covering the other eye, the patient fixes the eye under examination steadily on a chalked dot in the middle of the board, which should lie in the same level with his eye, whilst the dimensions and shape of the field are ascertained by moving a white object in various directions over the board, and marking the places where it is distinctly perceived, where dimly seen, and where it becomes invisible. These points can be quickly noted with these signs, +, −, and o, + indicating distinctness, − dimness, and o invisibility. By connecting each series of signs, an outline of the field of vision may be obtained. In particular cases it is well to go over this a second, or even a third time, in order to check errors. Two things must be carefully attended to, 1st that the patient's distance from the diagram board remains the same. 2nd that his eye is not moved off the fixing point. This point is sometimes eccentric, and is not always that of most distinct vision. The reduction and transfer of the map to paper is facilitated by the division of the diagram board into squares. In order to save time, I often map the field at once on a large sheet of paper, in which case the fixing point and the object which is moved about the field are black. A small disc of card, one side black and the other white, to admit of its

use on a black or white ground, fixed on a long wire, is very convenient.

Case 1.— *Horizontal hemiopia. Inflammation of the optic nerve and adjacent choroid and retina*

D. P., æt. 22, a healthy, fresh looking country school-mistress, came to the Royal London Ophthalmic Hospital, January 28th, 1859, for advice about her left eye. Its external appearance was healthy, but the pupil, of medium size, acted sluggishly. A large brown spot hovering before the eye, first noticed one year previously, was the first symptom, latterly the eye had soon tired. She could recognize large objects in the upper part of the field of vision above the level of the eye, at the distance of a few feet, but they were indistinct and seemed to her to have a tremulous motion ; she could spell No. 15 slowly and with hesitation. Objects lying below the level of the eye were invisible ; the lower half of the field of vision was cut off by a wavy line. With the ophthalmoscope the optic nerve entrance and the fundus immediately around it were observed to be concealed by a greyish exudation, in the neighbourhood of which the vitreous humour was hazy. The convex bends of the large retinal veins, where they approached the surface, were dimly visible through the opaque matter. These morbid appearances were confined to the neighbourhood of the posterior pole. Under a course of corrosive sublimate the exudation in the retina and choroid disappeared, and the vitreous humour became clear. It was now seen that the upper and inner $\frac{2}{3}$ of the circumference of the optic nerve entrance were blurred, confused, and bordered by a patch of withered retina and choroid. The disappearance of the exudation was attended with improvement of vision in the upper part of the field, and on March 25th, No. 2 was read with ease. While the patient remained under my observation (about eighteen months), the shape of the field underwent scarcely any change. Fig 1 is reduced from one of several maps I made of it

Fig. 1.

from time to time. The white represents the remaining area of the visual field, within which objects were recognized, + being the fixing point where sight was sharpest ; the black is the part of the field which had been curtailed ;

the shaded band represents a portion of the field, varying from ½ an inch to 2 inches in width, within which the distinctness of objects progressively decreased as they were moved downwards towards the black. The distance between the upper margin of the lowest incurve of the shaded band was 3 inches below the fixing point.

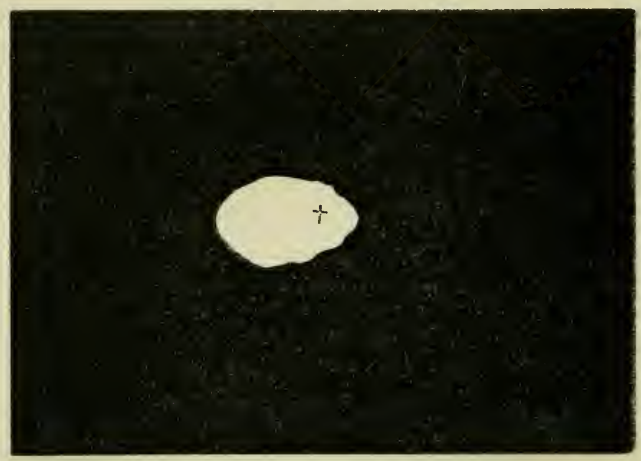
In the atrophy of a segment of the optic nerve and the immediately adjacent choroid and retina, we have the cause (an intra-ocular one) of the limitation of the field of vision. The withered patch at the optic nerve could not transmit the impressions received by the healthy retina beyond, and rendered the upper hemisphere functionally dead, by cutting off its communication with the brain.

Case II.—Great centripetal contraction of the field of vision Excavation of the optic nerve, (consequent on cerebral disease?).

E. S., æt. 42, a healthy looking brunette, was sent to the Royal London Ophthalmic Hospital, January 1st, 1861. She had long suffered much from headache and noises in the head: these had increased during the preceding eighteen months, while deafness of the left ear and a progressive centripetal contraction of the field of vision of the left eye, attended with photopsia, had taken place. She said that objects directly before the eye continued to be clearly seen until four months before she came to the Hospital.

The shape of the field (fig. 2,) was rudely oval, and, at twelve inches

Fig. 2.



distance, it measured only two inches by three. Within this small spot letters of No. 20 were slowly and hesitatingly recognized. The fixing point (+) was nearer the larger end of the oval. Excepting a widely dilated pupil, which acted only in concert with that of the other eye, the outward appearance of the eye gave no indication of disease. The ocular tension was natural and there had never been pain.

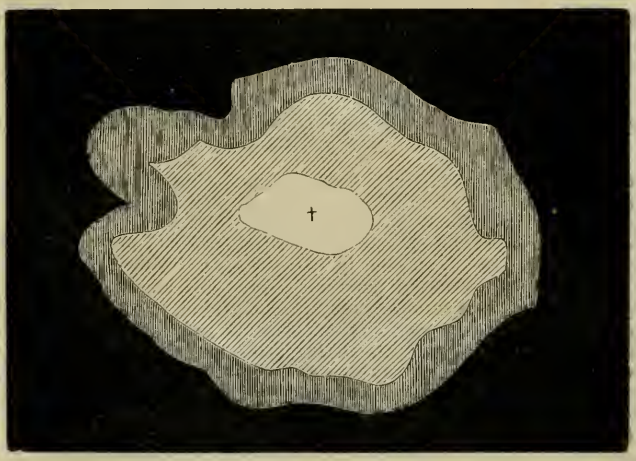
The optic nerve entrance was deeply hollowed and greyish white, the retinal veins were varicose and swollen, even to the lesser radicles. No spontaneous pulsation was visible. The abundance of pigment in the choroid (the patient a brunette) quite concealed its vessels, so that their con-

dition could not be made out. As the atrophy of the optic nerve entrance advanced, those nerve fibrils communicating with the most distant parts of the retina disappearing first, the transmission of impressions to the retina progressively failed from the ora serrata to the posterior pole, causing a corresponding centripetal contraction of the field of vision. Was the wasting of the optic nerve a primary affection, or secondary and consequent on some central cause? This latter view is favoured by the cerebral symptoms, but opposed by the patient's statement, that during the centripetal contraction the centre of the field continued good till four months before she came under my care; because, in cerebral amaurosis, vision at the centre generally decreases simultaneously with shrinking of the edge of the field. It is not unlikely that central vision had gradually deteriorated from the first, but had not been noticed by the patient until the imperfection had become considerable.

Case III.—Centripetal contraction of the field of vision. Inflammation and atrophy of the choroid and retina.

H. B., æt. 34, a thin, sallow, highly nervous woman, came to the Royal London Ophthalmic Hospital, June 13th, 1860. During the last four years she had suffered from menorrhagia, and habitual looseness of the bowels. Fifteen months before she came to Moorfields, her sight rapidly failed, so that in six weeks she could not discern her hand; subsequently, however, some improvement took place. With neither eye could she make out the letters of No. 20. The right pupil was dilated and sluggish, the left of medium size, and less inactive: there were no other external signs of disease. The field of vision of each eye, represented in figs. 3, 4, was centripetally contracted. Fixation (+) was central. The shading in the figures represents the progressive deterioration of vision from the centre outwards. The greatest dimensions of the left field (fig. 3) were 14 by 12½

Fig. 3.



inches; and the small oval at the centre, where vision was best, measured only 2 by 3 inches. The corresponding dimensions of the right field (fig. 4) were 13½ by 10½, and 9½ by 6½ inches.

In the right eye the optic nerve entrance and the retina were congested: around the posterior pole, the fundus was deep red, from hyperæmia of the

Fig. 4.

choroid; but at the equator and in front of it, the fundus was mottled with white patches, caused by the wasting and disappearance of the choroidal epithelium, and the atrophy of the chorio-capillaris; these white patches were traversed by swollen veins going to form the vasa vorticosa, and dotted over and fringed with flocs of black pigment. The intermediate portions of the choroid, between the white patches, were overlaid with a greyish exudation. The ophthalmoscopic appearances in the left eye were similar to those in the right, only less advanced.

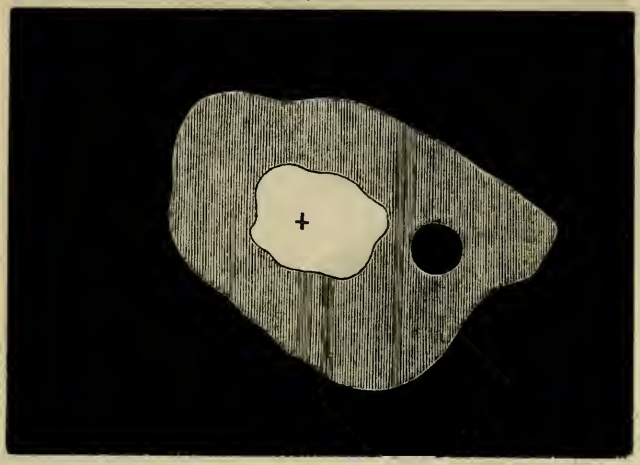
Case IV.—Centripetal contraction of the field of vision. Choroido-retinitis with atrophy.

G. C., æt. 37, sallow, in broken health, whose sight had been slowly failing for two years, and this without pain or external redness, sought advice at the Royal London Ophthalmic Hospital, December 6th, 1860. The right eye with difficulty discerned letters in No. 15; the left could merely distinguish a printed from a blank page, and indistinctly recognize my fingers held at a few inches distance. The left pupil was dilated and almost motionless, the right about medium size and inactive. The field of vision of each eye had greatly shrunk. The greatest dimensions of the right, which is represented in fig. 5, measured through +, the fixing point, were 15½ by 10½ inches, and those of the white space, where vision was relatively distinct, were only 5½ by 4½ inches. The circular black spot is that part of the field which fell on the optic nerve entrance, and was consequently unperceived—the blind spot. The ophthalmoscopic appearances in both eyes were similar; and in front of the equator the choroidal pigment epithelium was generally absent, and the chorio-capillaris atrophied: the white sclerotic, thus exposed to view, was covered with an irregular black tracery. The optic nerve and the retina were anæmic.

In this and in the preceding case, a slow atrophy of the retina and

choroid, travelling backwards from the ora serrata, produced the centripetal shrinking of the visual field, the centre remaining good until late in the disease. This form of choroido-retinal inflammation, which has been called retinitis pigmentosa, is very insidious, and has frequently made considerable

Fig. 5.



progress before medical advice is obtained. It not unfrequently occurs in several members of a family, and affects successive generations. It has no necessary connection with a syphilitic or strumous taint. The rate of progress is generally so slow, that it is difficult to estimate the value of any mode of treatment.

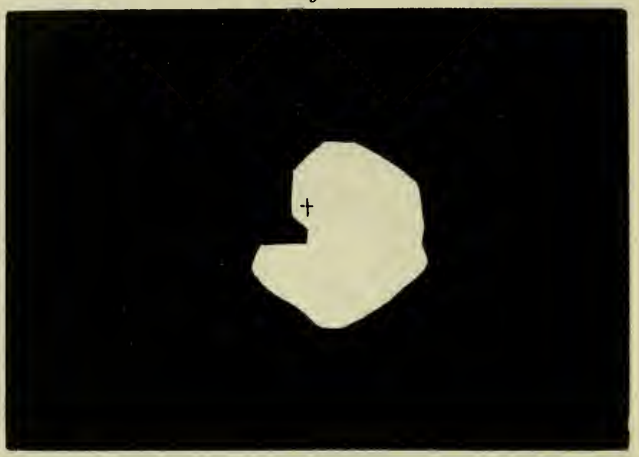
Case V.—Abscision of the left half of each field of vision, depending on an intra-cranial cause.

J. L., æt. 54, a man whose health and circumstances had been much impaired by hard drinking, whose memory had latterly failed much, and who had recently suffered great privation, was suddenly seized with dizziness and violent pain, as if a knife were darted through his head just behind the temples. It is not quite clear whether there was momentary unconsciousness, but he seems for a few days to have been slightly hemiplegic. These symptoms were attended with a very remarkable mutilation of the visual field of each eye; in his own words, "after the attack, my sight got narrow." In neither eye were there any external signs of disease. In both hypermetropia = $\frac{1}{36}$ was present. With each eye he could read No. 16, when the types were held to the right hand, or with his head slightly turned towards the left. In figs 6, 7, reduced diagrams of the right and left fields, it will be observed that the fixing point (+) lies in each at the left side; the right half of the field having been cut off. A horizontal line drawn through + measured 27 inches in the right field, and 14 in the left; the greatest vertical measurement of the right was 31 inches, and of the left 22. From this it will have been seen that the left was much smaller than the right field: in both a general similarity of outline is discernible.

The ophthalmoscope showed great venous congestion of each retina, this was greatest in the left, in which the whole venous system was turgid and

varicose. There was no other morbid sign, and no difference was discernible in the right or left half of either retina.

Fig. 6.



These intra-ocular appearances were insufficient to explain the remarkable abscision of the left half of each field of vision, which could only be accounted for by an intra-cranial cause, and supposing through the decussation of the optic tracts, each tract to supply fibrils to that half of each retina of

Fig. 7.

its own name (the right tract to supply the right half in each, and the left tract the left half), it followed that this cause lay behind the decussation in the right optic tract, or in the centres with which this is connected. The suddenness, the dizziness, and the hemiplegia, pointed to a small hæmorrhage into one of these parts.

A CATALOGUE OF THE OPHTHALMOSCOPIC DRAWINGS IN THE LIBRARY OF THE ROYAL LONDON OPHTHALMIC HOSPITAL, MOORFIELDS.

C. Bader, *Curator.*

Continued from Vol. III, No. 1.

These drawings were made by Mr. R. Schweizer, the draughtsman to the Hospital. The fundus and optic nerve are represented about twice the size, that they appear as seen with the ordinary concave ophthalmoscope and a convex lens of two and a-half inch focus. Each case was repeatedly examined by Mr. Schweizer and myself, with a wish to insure its accurate representation. A detailed account of the cases is kept at the Hospital.

Having been entrusted with the selection and arrangement of the cases, drawings, etc., I have selected those which appeared to me to be typical cases.

The drawings of Group I, III, IX, X, XI, XII, were taken from cases in which there could be no doubt as to their healthy, syphilitic, glaucomatous, etc., nature.

In Group IV, V, VI, VII, and VIII, the cases are thrown together somewhat indiscriminately. Thus a case in which bloodspots were the first ophthalmoscopic signs observed in the fundus has been placed in Group V, though the subsequent changes may comprise displacement of the retina, retinitis, etc.; when complicated with rupture of retinal blood-vessels occurring in cases of Bright's disease or diabetes mellitus, are placed under Group V, etc., etc. Many of the cases of these latter groups might have been arranged similar to Group I, III, IX, etc. We know that blood diseases (like measles, scarlatina, ague, smallpox, etc.), when implicating the eye, produce visible changes, chiefly in the choroid; that anomalies of the urine (diabetes insipidus, mellitus, etc.), are frequently complicated with escape of blood and other substances from the retinal blood-vessels. This arrangement must be considered simply as provisional, until we shall have become better acquainted with the changes of the deeper parts of the eye.

We shall in the following descriptions, among others, have to use the terms optic nerve and fundus in a special sense. The term optic nerve is restricted to that part of the nerve which is visible with the ophthalmoscope, before it has spread upon the retina; the terms entrance of the optic nerve, optic papilla, etc., have formerly been used for this portion of the nerve. Fundus is a collective expression for the coats of the eye (sclera, choroid, and retina), as far as they are concerned with the ophthalmoscopic examination. Thus we speak of a fundus sprinkled with blood-spots, with white opaque patches, mottled with pigment, etc., and shall have to explain the anatomical bearing of these expressions.

Group I.

Plate I.—Fg. 1 and 2. The l. o.n. is slightly oval from above downwards; the r. is not quite round; both are pale pink, except immediately round the blood-vessels; these are separated from the pink portion of the nerve by a pearly-white, opaque, roundish spot. More vessels pass in and out of the l. eye; the arteries have double contours, *i.e.*, the blood appears only to run along the sides of the vessel. The fundus has a pale pink colour, with a slightly bluish tint; this tint is most marked immediately round the optic nerves (at the choro-retinal aperture). Fg. 3. The o.n. is oval from above downwards, and pink, except a small pale white and opaque portion which

surrounds the retinal blood-vessels. Two arteries and two veins pass through the o.n. ; the arteries are double-contoured, and send out numerous smaller branches, after having passed the retinal aperture; the neighbouring fundus has a deep blue colour, slightly tinged with red.

Plate II.—Fg. 1. The yellow spot appears as a well-defined bluish black dot, surrounded by a fawn-coloured halo, slightly tinged with blue. Fg. 2. The yellow spot appears as a light brown dot, surrounded by a greyish pink halo, which shades off into the pale pink fundus. Fg. 3. The yellow spot appears as a round reddish spot, shading off into a light red fundus.—I have observed that if one parent has a blue, the other a brown, iris, their child may have a blue iris, and its fundus may have the appearance of the fundus of a person with brown irides, and *vice versâ*.

Plate III.—The views are intended to show the different arrangements of the veins of the choroid round the o.n. (fg. 1), in the region of the yellow spot (fg. 2), and at the equator of the eye (fg. 3). The spaces between the veins of the choroid are occupied by the brown (stellate) pigment of this coat, in the form of dark islands, the shape of which varies according to the arrangement of the enclosing veins. We infer from the different appearances of the fundus of the healthy blue, black, etc., eye, that the fundus will appear the more red, the less the choroidal pigment impedes (absorbs) the light in its passage through the pigment and blood-vessels of the choroid to the sclerotica; that the region of the yellow spot, and the yellow spot itself, can be seen in the healthy human eye, and appear different in dark, fair, etc., eyes; that the o.n. appears more pink in fair than in dark eyes, and that its diameter is smallest where it passes through the choroidal aperture; its shape, round, oval, etc., is, therefore, in most cases, indicated by the shape of that aperture. An accumulation of the choroidal epithelium is sometimes seen in the healthy eye, in form of a narrow brown or black line skirting the choroidal aperture. (See pl. I, fg. 1). The blood-vessels in the o.n. are kept apart from the bundles of o.n. fibres by a fibrous canal, the fibres of which have an arrangement similar to the circular fibres of arteries; these fibres, when present in great quantity, are, with the ophthalmoscope, seen as a brilliant white, opaque, roundish spot, intervening between the retinal blood-vessels and the pink (nervous) portion of the o.n. (See pl. I, fg. 1, 2, and 3).

Group II.

Plates I. & II.—The optic nerves appear deep pink; the retinal blood-vessels are numerous. A crescentic white patch, similar to what is seen in myopia, skirts the upper margins of the o.n.; the neighbouring fundus is brilliant yellowish white (reflection of light from the sclerotica), and overspread by large flat tortuous (choroidal), and by straight (retinal) blood-vessels. Several of the choroidal vessels pass across the crescentic patch. The fundus, at some distance from the o.n., assumes a brilliant red colour, which begins in an abrupt line, the large choroidal blood-vessels disappearing beneath the red. (See pl. II, fg. 2.) We suppose the almost entire absence of the stellate (choroidal) pigment and of the choro-capillaries to be the cause of this peculiar state of the fundus round the o.n. The same scarcity of pigment probably contributes to the brilliant red colours of the remaining fundus. The large choroidal blood-vessels appear less numerous in the posterior portion of the fundus; but their general arrangement is the same as in the healthy eye.

Plate III.—Fg. 1. The opaque band (breadth 3‴, length 6‴) extends from the o.n. forwards and downwards upon the retina; its sides are well defined, and its distant end shades off into the fundus. It is of the same colour as the adjoining o.n.; the remainder of the o.n. is pink. Several of the retinal veins take an unusually curved course, which I have never before

observed in a healthy eye; the fundus appears otherwise normal. The opaque band is amply overrun by small retinal blood-vessels, which anastamose frequently, and take a parallel course; these disappear in the normal portion of the fundus. I believe, from the situation of the retinal blood-vessels, the o.n. fibres to be transparent, and the opaque band to be situated in the retina; it may be due to an opaque state of the connective tissue of the retinal elements.

Plate IV.—Fg. 1 & 2. The upper portion of the fundus, represented in fg. 1 and 2 is a brilliant, blnish, opaque white; the lower portion is of a pale pink tint, overspread by a few large choroidal blood-vessels, and (in fg. 2) traversed by an abrupt line of brown (choroidal) pigment. Few and slender retinal blood-vessels ramify in an irregular manner over the fundus; most of these vessels converge towards a greyish, opaque, roundish spot (fg. 1), which is of the size of an ordinary o.n.; three other roundish spots of a similar colour (fg. 1 and 2) are seen near the above. We should be in doubt which to pronounce to be the o.n. if it were not for the convergent course of the retinal vessels towards the above spot; several of the retinal vessels appear to pass through the coats of the fundus, before reaching the o.n..

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Part I.

Original Contributions.

ON THE RELIEF OF SYMBLEPHARON BY TRANSPLANTATION OF CONJUNCTIVA.

By T. Pridgin Teale, Jun., M.A. Oxon., F.R.C.S.

The acknowledged difficulty * of effecting a permanent cure of symblepharon, induces me to bring into notice the following cases, which illustrate a mode of treatment by which adhesions and frœna of the eyelids, resulting from destruction of conjunctiva, may be effectually and permanently relieved, provided they be of moderate extent.

The plans at present most in favour for the relief of symblepharon are based upon division of the bands or adhesions, and the mechanical separation of the lid and eyeball until the raw surface is healed. The completion of the healing process is, however, at the best, but the commencement of relapse: and the resulting cicatrix yields to the

* See Mr. Wordsworth's paper in the preceding Number of the Ophthalmic Hospital Reports.

same law of contraction which rules cicatrices in other parts of the body, and the case recurs to the condition in which it was found previously to the operation.

In a few cases so treated no doubt some improvement has been obtained, the result, not of non-contraction of the cicatrix, but from the contracting process having drawn upon the neighbouring healthy conjunctiva, which has been thus displaced into the situation of the original cicatrix.

The difficulties, therefore, that are met with in the attempt to relieve symblepharon appearing to be of the same kind as those which have to be encountered in relieving cicatrices of skin, I have adopted in the treatment of the former what has proved eminently successful in the treatment of the latter, namely, transplantation of healthy tissue.

Mode of operating.—Having first made an incision through the adherent lid, in a line corresponding to the *margin* of the concealed cornea (See Fig. 1, A), I dissected the lid from the eye-ball until the globe moved as freely as if there had

Fig. 1.

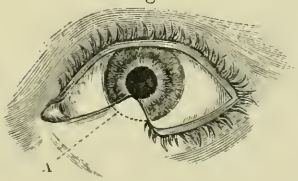
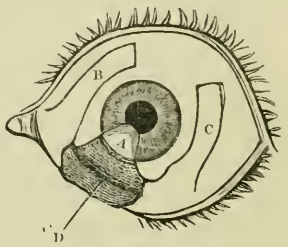


Fig. 2.

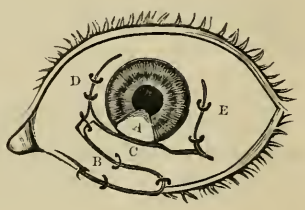


been no unnatural adhesions. Thus the apex of the symblepharon (Fig. 2. A) being part of the skin of the lid, was left adherent to the cornea.

In the next place two flaps of conjunctiva were formed, one from the surface of the globe near the inner extremity of the raw surface, the other from the surface of the globe near its outer extremity. I first marked out with a Beer's knife a flap of conjunctiva (B. Fig. 2), nearly a quarter of an inch in breadth, and two-thirds of an inch in length, with its base at the sound conjunctiva, bounding the inner extremity of

the exposed raw surface, and its apex passing towards the upper surface of the eyeball. The flap was then carefully dissected from the globe until it was so far at liberty as to stretch across the chasm without great tension, care being taken to leave a sufficient thickness of tissue near its base. A second flap was then made on the outside of the eyeball in the same manner. In making the flaps, conjunctiva alone was taken, the subconjunctival fascia not being included. The two flaps thus made were then adjusted in their new situation (See Fig. 3). The inner flap, B, was made to stretch across the raw surface of the eyelid, being fixed by its apex to the healthy conjunctiva at the outer edge of the wound. The outer flap, C, was fixed across the raw surface of the eyeball, its apex being stitched to the conjunctiva, near the base of the inner flap. Thus the two flaps were dovetailed into the wound. The flaps having been adjusted in their new position, their vitality was further provided for by incising the conjunctiva near their base, in any direction in which there seemed to be undue tension, and by stitching together the margins of the gap whence the transplanted conjunctiva had been taken, (*e. g.*,) D, E, Fig. 3. One or two other sutures were inserted, with a view to prevent doubling in of the edges of the transplanted conjunctiva.

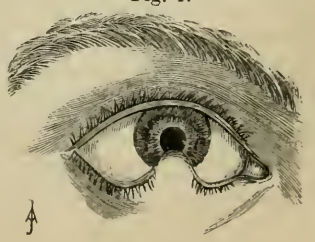
Fig. 3.



Case I.

April, 1860.—Joseph Jesssop, aged 40, a "puddler" at an iron foundry. Twelve months ago was struck in the right eye by a hot cinder, which has given rise to a symblepharon. (See Fig. 4.) The middle portion of the lower eyelid for the breadth of one-third of an inch is adherent to the eyeball, the skin of the lid being blended with the surface of the cornea to such an

Fig. 4.



extent as to conceal the lower margin of the pupil. The movements of the eye are much restrained, so that he cannot look to one side without turning his head: as he says, "he can't look no way." There is epiphora, as the tears cannot make their way to the puncta. Vision is also somewhat interfered with.

April 7.—The eyelid having been dissected off the globe, two flaps of conjunctiva were dovetailed into the situation of the symblepharon, the skin forming the apex of the symblepharon being left on the surface of the cornea.

August 27, 1861.—It is now difficult to distinguish the eye operated on from the other. The movements of the eye are perfectly free in all directions. There is a band of transplanted conjunctiva three-eighths of an inch in breadth, extending from the edge of the lid to the margin of the cornea, and dipping down between the lid and the eyeball. The epiphora has ceased. The apex of skin left on the cornea has become transparent, and can only be detected by examination under a strong light. The sight has also considerably improved.

Case II.

March 15, 1861.—James Spence, aged 16. Five months ago the inner corner of the left eye was struck by some hot metal, which destroyed a considerable portion of conjunctiva. The inner third of the lower lid is adherent to the eyeball, and extends over the inner and lower part of the cornea, as far as the margin of the pupil. The movements of the eye are impeded, especially during eversion.

March 30.—Adherent lid dissected from the eyeball, and two flaps of conjunctiva dovetailed into the wound, the apex of the symblepharon being left adherent to the cornea.

August 19.—The movements of the eye are perfectly free, the power of eversion being equal to that of the sound eye. There is now a breadth of half an inch of transplanted conjunctiva between the margin of the lid and the margin of the cornea. The apex of the symblepharon left on the cornea is becoming atrophied, being transparent at its margin, and shrunk to the level of the surface of the cornea, on which originally it formed a considerable prominence. There is also some improvement in vision.

Case III.

June 14, 1859.—Tom Baily, aged 17. Four months ago the inner cornea of the left eye was burnt by a piece of molten metal.

There is now a broad frænum binding the punctum of the lower eyelid to the surface of the cornea, which it conceals to the extent of one-eighth of an inch.

First Operation.—June 15.—The broad frænum was divided, and the resulting gap was closed over by stitching together the margins of conjunctiva bounding it. All tension was removed from the sutures by incising the conjunctiva in a direction parallel to the union.

July 8, 1861.—There has been considerable improvement since the opera-

tion, as no frænum is visible unless the lid is put on the stretch, when a shallow band appears which rather checks the free movement of the eye.

Second Operation.— July 8.—The remains of the frænum and the adherent lid having been set free from the eyeball, a single flap of conjunctiva was transplanted from the inner surface of the eyeball and placed in the gap.

August 20.—Perfect freedom of movement of the eye. There is a space of half an inch between the previously tethered punctum and the margin of the cornea, into which conjunctiva has been introduced, partly by displacement, and partly by transplantation. The remains of the frænum which were left adhering to the cornea have become invisible, except on minute inspection.

Case IV.

March 22, 1860.—Frederick Hattersley, aged 24. Inner portion of lower lid and neighbouring conjunctiva destroyed by hot metal, which has caused extensive symblepharon, which conceals the lower portion of the cornea and one-third of the pupil.

This was the first case in which I attempted transplantation, and has been only partially successful In March, a single flap was transplanted into the symblepharon, which retained its vitality, but slightly receded from the opposite extremity of the wound, in which situation there was a relapse of symblepharon.

In July, 1861, a second flap was transplanted from the opposite side, which has afforded some improvement and increased freedom of the motion of the eye. The result, however, is by no means equal to the preceding cases. It was in consequence of the partial failure in the first operation in this case that I was led to adopt the plan of making two flaps, which not only provide for the introduction of a greater breadth of new tissue, but also by projecting beyond one another allow of a certain amount of retraction without risk of a relapse of the symblepharon.

By the foregoing cases, the following points appear to be established:—

1. That conjunctiva may be transplanted without losing its vitality or properties.

2. That a symblepharon may be replaced by loose moveable conjunctiva, at least equal in breadth to the flaps originally transplanted.

3. That a comparatively small breadth of conjunctiva introduced into the situation of a symblepharon is sufficient to afford greatly increased, if not perfect, freedom of motion to the eye-ball, a freedom which continues to increase for many months after the operation.

4. That where the conjunctiva of the lateral and upper parts of the eyeball has not been damaged, flaps of a quarter of an inch in breadth may be taken away without giving rise to any deterioration of the parts whence they have been taken.

5. That in separating the adherent eyelid from the globe, it is not necessary to dissect off from the cornea any portion of skin that may be adherent to it, but that it is better to commence the separation of the lid at the margin of the cornea, leaving the opaque apex of the symblepharon adherent to the cornea.

My object in commencing the separation of the lid at the margin of the cornea, thus leaving an opaque island of skin on the cornea, was two-fold. In the first place, it seemed more than probable that, if the corneal surface had been denuded of its adherent skin, any conjunctiva transplanted into the gap would be drawn by cicatrization over the newly-made raw surface of cornea, as the skin of the eyelid had been in the first instance. The conjunctival flap would thus have been rendered useless, and the opaque skin would have been replaced by not very transparent conjunctiva. In the second place, I had a faint hope that the isolated portion of skin, being cut off from all continuity with skin, and depending for its nutrition on the cornea supporting it, and a merely *cicatricial* union with conjunctiva, might become atrophied and less opaque. The result has far exceeded my expectations. In the case of Jessop, the trace of this skin can only be detected in a good light. In two other cases the situation of former frœna can only be seen on minute inspection. In the case of Spence, operated on last March, the edges of the opacity have become transparent, and the remaining portion is atrophied, and but little raised above the level of the surrounding cornea.

MEDICO-LEGAL OBSERVATIONS IN CONNECTION WITH LESIONS OF THE EYE.—(*Continued.*)

By A. Poland.

We have now to record two additional cases which have undergone recent litigation in a court of law. These present no direct or primary lesion of the organ itself, but the defective vision, which ensued and for which compensation was demanded, took place in consequence of some disturbance in the brain, optic nerve or retina, unappreciable to the surgeon.

Case IV.

This case was recently argued in the Court of Exchequer for a new trial in consequence of the large amount of damages awarded on a previous occasion. We have inserted the whole of the case in full, as published in the daily newspapers. It would have been more satisfactory, in a medical point of view, to have had a full detail of the statements of the medical witnesses; but the reporter remarks, "it is needless to go through all the medical testimony." The curious part of the case is, that the injured man, who was a corn and flour factor, declared that after the accident *all things appeared to him yellow*, and that this interfered with his business. The jury believed him, and gave him very large damages in 1,200*l.*

Court of Exchequer.—Dec. 11, 1860.

[Sittings at Nisi Prius at Guildhall, before the Lord Chief Baron and a Special Jury.]

Williams *v.* the Great Northern Railway Company.

Mr. Power, Q.C., and Mr. Quain, were counsel for the plaintiff; Mr. Hawkins, Q.C., and Mr. C. Pollock, represented the defendant.

This case commenced yesterday, and was an action brought to recover compensation in damages for injuries which befell the plaintiff by reason of a train in which he was travelling, in the centre compartment of a first-class carriage, on the 20th of May last, running through the King's-cross station over the street into the New Road, where its further progress was arrested by an embankment, which had been thrown up by the men employed in making the Metropolitan Underground Railway. From the plaintiff's account of the transaction it appeared, that having been in business with others as a corn

and flour factor he failed, paying to his creditors a composition of 7*s.* 6*d.* in the pound; and that, starting again upon a borrowed capital of 90*l.*, his business thrived until he paid an income-tax upon 600*l.* a year. That coming to London upon business, an accident happened as above described, injuring his head and shoulder at the time, but not so severely as to prevent him from walking back to the station, and then across to his lodgings. That upon the following morning, upon getting out of bed, he felt a soreness across the loins and a stiffness of the limbs generally, but attended his business appointment with a Mr. Nelson, an attorney in the city, who, conceiving him to be ill, advised him to return and leave the business for some future time. The plaintiff returned home to Liverpool and consulted his medical adviser, who eventually sent him to Wales, where, it appeared, he was visited by Mr. Millwood and Dr. Harrison on behalf of the company. The plaintiff complained that he was totally unable to attend to his business, although he had made efforts to do so, and was still suffering from soreness about the loins, and his sight was very indifferent.

Dr. Hensman, of Liverpool, the plaintiff's medical attendant, said, that upon examining him he found a contusion over the temporal bone, besides one on the right shoulder, with loss of power in the arm; a discolouration of the right and left side of the spine among the lumbar muscles; numbness of the lower extremities, great depression of spirits, and an inability to describe what had happened to him; the brain had been disturbed, causing an affection or injury to the optic nerve. The plaintiff complained that all objects appeared yellow to him. The spinal column was uninjured.

Mr. Quain (in company with Dr. Owen Rees) had examined the plaintiff, and stated that, in his opinion, the principal injury was to the brain, which accounted for a want of intelligence he noticed in him, as well as the defectiveness of vision. The recollection that the plaintiff had of things long past, and no memory relating to things of recent occurrence, he considered a very bad sign.

It is needless to go through all the medical testimony.

The negligence and liability of the company through the drunkenness of their servant was admitted, and the only question for the consideration of the jury was the amount of damages the plaintiff ought to receive under all the circumstances of the case.

Mr. Coulson and other surgeons were called for the defence, who did not appear to take so gloomy a view of the plaintiff's condition as the gentlemen on the other side. Mr. Coulson was of opinion, after a careful examination of the plaintiff, that his ultimate recovery was more than probable.

The fact that the accident had caused all things to appear yellow to the plaintiff's sight raised a question for the discussion of the medical world at some future time, as no one appeared able to account for it.

After Mr. Hawkins had summed up his evidence for the company, and Mr. Power replied upon the whole case,

His Lordship left the matter in the hands of the jury, who retired to consider their verdict, and after an absence of some hours, returned into court, finding for the plaintiff—Damages 1,200*l.*

COURT OF EXCHEQUER.—MAY 1, 1861.

[Sittings in Banco, before the Lord Chief Baron and Barons Martin, Bramwell, and Wilde.]

Williams *v.* the Great Northern Railway Company.

Mr. Power showed cause against a rule obtained by Mr. Hawkins, on behalf of the defendants, calling on the plaintiff to show cause why there should not be a new trial on the ground that the verdict was against evidence, and on affidavits. The action was brought by the plaintiff, a flour merchant, to recover from the defendants damages for injuries sustained by reason of the negligence of their servants. It was tried before the Lord Chief Baron at the Guildhall sittings, and resulted in a verdict for the plaintiff with 1,200*l.* damages. It appeared that on the 31st of May, 1860, the plaintiff was a passenger by the defendants' line from Hitchin to London, when in consequence of the guard being inebriated, he neglected to turn on the break on the arrival of the train at King's-cross, when it dashed through the station into the New-road, and was only stopped by the embankments there. It was shown at the trial, by the evidence of the plaintiff himself and of several medical witnesses, that he had received severe injuries, and his sight was so much injured that he was unfitted for carrying on his business. After the plaintiff had recovered his verdict, a detective had been set by the company to watch the trial, and had been to Wales and to other places, on which he made an affidavit to show that the injuries complained of had been much exaggerated, and that the damages were consequently excessive. On this a rule for a new trial was granted in January last.

Mr. Quain followed on the same side.

Mr. Hawkins (with whom was Mr. Charles Pollock) in support of the rule, said he had to submit that the damages were excessive.

The Lord Chief Baron said that, generally speaking, juries gave fair and reasonable damages, although now and again it did occur that they took a strong view of a case. The accident in the present case had been of a most outrageous character; and putting aside all question of pain, he did not think that the plaintiff would have been reduced from what he had been before to what he had been afterwards for 1,200*l.*

Mr. Hawkins said there had been great exaggeration with reference to the plaintiff's business profits. It was true he had made 600*l.* a year while he was in partnership, but after it was dissolved he had compounded with his creditors, and had started again with a borrowed capital of 90*l.*

Mr. Baron Martin: That is only a proof that he more required health to carry on his business. You had much better have a new trial and try what your detective will do [laughter].

Mr. Hawkins: The detective swears that the day after the trial he saw the plaintiff go into the London Coffee-house, and having read a newspaper, he read "Bradshaw's Railway Guide" for thirty minutes, and I don't think there can be a more profitable employment [laughter].

The Lord Chief Baron: I take it that is strong proof he was suffering in his brain [renewed laughter].

Mr. Hawkins: It was no proof that he was, as sworn to at the trial, "a man with yellow eyes." The detective also swore that he saw plaintiff get up actively on an omnibus—change his seat from the knife-board to the driver's seat, and then jump down off the fore wheel [laughter]. It shewed that the verdict of 1,200*l.* had a beneficial effect on his health, for as soon as he recovered it he could go to wine vaults in the morning, and to public houses in the evening.

Mr. Baron Wilde: There is a mass of evidence by persons of all kinds and all sorts to show, that since the trial the bodily health of the plaintiff was as described.

Mr. Baron Martin said, he was of opinion that the rule might be discharged. They had no guide for saying the damages were excessive—if they were so the Court would interfere. The judge who tried a cause was the person the best qualified to form an opinion on this point; and the Lord Chief Baron did not report that he was dissatisfied with the verdict. For his own part, if the case went down for a new trial, and it was shown that a railway company had set a detective to dog plaintiff's steps, and to pursue him for months, no summing up in the world would prevent him, if he were the jury, from returning a verdict for the plaintiff. He must say, it was a most scandalous act.

Mr. Baron Bramwell was of the same opinion. He thought that in cases of this kind, personal suffering must be taken into account. We had all to bear suffering in this world, and what he should complain of was that a man should augment his (Baron Bramwell's) sufferings. He, however, must say that if the company believed the plaintiff was playing a trick, he could not see whom they could employ but a detective. They could not engage an ambassador, for instance, or any person in that dignified position [laughter].

Mr. Baron Wilde said that if the servant of a railway company got inebriated, and thus hazarded the lives of hundreds, it was quite right the company should pay for it. He concurred with his brother Martin in the impropriety of the company having sent a detective to dog the plaintiff's steps, and he placed not the slightest reliance on the evidence of the detective officer.

The Lord Chief Baron considered that the damages had not been excessive.

The rule was then discharged.

Remarks.—This very rare and extraordinary effect, consequent upon an injury, gives rise to much speculation, and, unfortunately, depends upon the man's statement, who was interested in making as much as he could of his ailments, in order to increase the amount of damages. If there had been changes in the vitreous humour, or effusion and deposits about the retina, choroid, &c., as may be detected by ophthalmoscopic inspection, we could well have appreciated

the defect. From what could be gleaned of the case, the eyes were very carefully examined, and no one appeared able to account for the yellow vision.

Case V.

This was the subject of trial at a home circuit Croydon, on August 7th, 1861. The man was a post-office letter sorter and had been nine years so employed, and up to the time of the accident had good vision. He received concussion of the spine and back of the head, which laid him up for some time inducing great debility, and consequent upon this his sight became defective insomuch that he could not follow his occupation, and was now labouring under asthenopia. The subjoined account is that published in the daily newspapers, the only public record of actions of this kind:

HOME CIRCUIT.—Croydon, August 7.

Clements *v.* The London and North-Western Railway.

Mr. Hawkins, Q.C., Mr. Cranfurd, and Mr. Lumley Smith were counsel for the plaintiff; and Mr. Bovill, Q.C., and Mr. C. Pollock represented the company.

This action arose out of an accident which was of a very fearful character. It will be remembered that, on the 16th of November last, the mail up train, travelling at the rate of forty miles an hour, ran into a cattle train at Atherstone, and the consequence was that nine of the drovers in charge of the cattle were killed, and a number of the Post Office servants, who were travelling in the Post Office van, were seriously injured. The plaintiff, who was engaged as a letter sorter, and who received 75*l.* a-year salary, which, with other payments, amounted to nearly 150*l.*, had, it appeared, received an injury by an accident of a similar character, that occurred at Rugby in March 1859, and upon that occasion the company gave him 120*l.* as compensation. At the second accident it appeared that he was thrown a distance of twenty-two feet, and that several of his companions, who were with him in the Post Office van, were thrown upon him; and it was alleged that he had received an injury to his spine, and that his eyes were affected by the shock that he had received; and in order to make out these facts, Dr. Waller Lewis, the physician to the Post Office, Dr. Pearson, Dr. Webb, Mr. Gay, and Mr. Poland, and Dr. Farre, all of whom are eminent in their professions, were examined, and they expressed their opinion that the plaintiff had sustained very severe injury from the shock that he had received. In the course of the trial an offer was made, on the part of the defendants, to consent to a verdict with 250*l.* damages; but this offer the plaintiff refused to accept, and the case proceeded. At the close of the plaintiff's case, on Tuesday evening, a suggestion was made that the plaintiff should consent to allow his eyes to be examined by Mr. Haynes Walton, by an instrument called an ophthalmoscope; but although the learned judges expressed a strong opinion that he ought to allow this to be done, he refused, and the trial was then adjourned.

Mr. Bovill, at the sitting of the court this morning, addressed the jury for the defendants, and he said that the answer to the action was that the plaintiff had greatly exaggerated the injuries he had received, and he called as witnesses Mr. Haynes Walton, Mr. Arnott, Mr. Partridge, Mr. Barnard Holt, and Mr. Skelding, all of whom stated that they had made a careful examination of the plaintiff, and could not discover the slightest indication of his having sustained any injury to the spine; and with regard to the condition of his eyes, they stated that he was suffering from a malady called asthenopia, to which all persons who were engaged in examining minute objects by strong artificial light were subject, and that it was not at all of a permanent character, or in any way to be ascribed to the accident. Several of these gentlemen stated, in answer to questions put by Mr. Hawkins, that they were paid five guineas for making a report upon the case to the railway company, and twenty-five guineas per day for attending to give evidence; but they stated also that they expected the same fee from their private patients, and that it was their usual charge.

Mr. Skelding, one of the medical witnesses for the company, on cross-examination by Mr. Hawkins, said that when an accident happened upon the line it was usual to send for him to see the patients upon their arrival at Euston-square, and he had been so called upon probably a hundred times in the course of the year, and he took a note-book with him and made notes of the different cases, and reported upon them to the company. He also said that when a patient "broached" the subject of compensation he entertained the question, and reported to the company his opinion as to the amount of compensation that should be given, and sometimes paid them with his own cheque. The plaintiff, in the first instance, required 550*l.* damages, and he advised that an offer of 250*l.* should be made him.

In answer to a question put by Mr. Bovill, in re-examination, Mr. Skelding said he should not have advised this offer to be made if he had been aware that the plaintiff would have refused to allow Mr. Walton to examine his eyes and that there were grounds for believing that the defect existed in them long before this accident, and that, in point of fact, the accident had nothing whatever to do with it.

Mr. Bovill, in summing up the defendant's case, complained a good deal of the course that had been taken by Mr. Hawkins in bringing out the fact that an offer of 250*l.* had been made to the plaintiff on the previous evening, and he said that the offer was made in ignorance of what was afterwards ascertained, that there was reason to believe that the injury to the plaintiff's eyes had solely arose from the nature of his occupation, and had nothing to do with the accident. This opinion was strengthened by the fact that the plaintiff had refused to permit his eyes to be examined, although the learned judge had so strongly intimated that he ought to do so. When the offer was made, the company believed that the plaintiff had really sustained an injury to his eyes that might require rest to restore them, and they made him an offer of a liberal compensation, but from what subsequently came to their knowledge they felt themselves justified in withdrawing that offer; and he

expressed his opinion that Mr. Hawkins ought not to have brought the offer before the jury, and that it was solely in the extremity of the case that he had felt compelled to do so. The learned counsel concluded by expressing his opinion that the evidence had clearly established that the injury sustained had been grossly exaggerated, and he called upon the jury not to give the plaintiff more than a reasonable amount of damages for the expense and loss of salary that he had sustained.

Mr. Hawkins, in a most able reply upon the whole case, commented in severe terms upon the conduct of Mr. Skelding in any transaction, and described him as a sort of lawyer's clerk, doctor, and compensation maker, whose only duty, he said, appeared to be to go to the bedside of any unfortunate person who had received injury through the negligence of the company, —not for the purpose of endeavouring to assuage their pain, or to render them any assistance, but, note-book in hand, to endeavour to extract from them something that was calculated to benefit the company; and he urged that, notwithstanding what had been said by his learned friend as to his having acted unprofessionally in extracting from him that he had recommended an offer of 250*l.* to be made to the plaintiff, he was perfectly justified in the course he had taken when he had to deal with a witness of this description. He then said that, without entering into the precise nature of the injuries sustained by the plaintiff, he would put it to the jury, as men of common sense, whether it was possible, having regard to the nature of the accident, and to the facts that nine unfortunate persons lost their lives, and that the plaintiff was violently thrown a distance of twenty-two feet, and four or five others were thrown violently upon him, that the plaintiff could have escaped without sustaining some severe injury from such a shock; and for that injury he called upon them to give him reasonable and proper damages.

Mr. Justice Williams, in summing up the case to the jury, said, that in itself it was one of a very simple character; but from the peculiar course of the evidence, it had, in his opinion, become of very considerable public importance. It was, no doubt, very necessary that any one who received injury in consequence of the negligence of a railway company, should receive compensation for that injury; but on the other hand, it was not to be tolerated that the occasion of a railway accident should render the company liable to pay large amounts of money for false and exaggerated claims, in order to put money into the pockets of persons who were not entitled to it, and those professional advisers who attempted to enforce claims of such a description. If such a course of proceeding were to be sanctioned, it would not only be extremely unfair and unjust to railway companies, but eventually the public must suffer by it, for the heavy costs and damages consequent upon it would compel railway companies to raise their fares, in order to cover those additional expenses, and the public would thus suffer very materially. His lordship then called the attention of the jury to the facts that had been brought forward, and expressed his opinion that the plaintiff had acted wrongly after this took place in refusing to allow his eyes to be examined, and he also said he thought it was wrong for Mr. Hawkins to have introduced the fact of the

offer of the 250*l.* having been made on the previous evening; but he was satisfied that he had done so under a misapprehension of the circumstances under which the offer was made.

The jury returned a verdict for the plaintiff, damages 275*l.* and they at the same time stated that they were not at all influenced in coming to this decision by the offer of the 250*l.*

Remarks.—There was no question about the man having sustained an injury, but the amount of damages depended upon the fact of the impaired vision, incapacitating him from his employment for an indefinite period. The evidence on this point put before the jury by the counsel for the plaintiff was of an extremely moderate and fair kind: one of the medical witnesses, who had had extensive experience in the use of the ophthalmoscope and other means of testing vision, deposed that he had made a careful examination of the plaintiff's eyes on the day preceding the trial, and that he found that the patient could see to read at the ordinary ranges clearly and distinctly but after some time vision became confused, the letters running into each other, so that he was unable to make out the words. The field of vision was next tested (conducted in the manner pointed out by Mr. Hulke, in the last number of this Journal), and it was found very defective; for only a small area about the centre was clear, and that vision gradually faded away and was entirely lost considerably within the natural ordinary limits. By the ophthalmoscope nothing abnormal could be seen, nor could any structural changes be detected sufficient to account for the impaired vision. The witness considered the effects to be referable to shock to the nervous system and general debility arising from the injury received.

The defence set up was that the impaired vision was not due to the accident at all, but was a sequence to his employment, as a Post-Office letter sorter; and the counsel for the defence put the following question, or words to the same effect, to the plaintiff's medical witness, in order to corroborate his argument: "Do you know of any employment more serious and detrimental to the sight, than the occupation of a letter sorter, who has to sort letters for many hours

at great rapidity, his eyes being exposed at the same time to a strong artificial light?" The medical witness declined answering the question, as having had no experience in the matter; he was attached to a large Ophthalmic Hospital, and had but rarely met with cases from the Post Office suffering from impaired vision, and could not conscientiously affirm the question. However the counsel urged the point, as a matter of opinion, and not of practice, and of course gained his object. A great deal of unnecessary quibble was made respecting the plaintiff, through his counsel, refusing to allow of his eyes being examined by the defendants' medical witness with an ophthalmoscope. There was no occasion for this at all, as the plaintiff's witness had already done so the day before, and had found nothing unnatural in the eye itself. The refusal was made of such importance, as to have had some weight with the judge and probably the jury. It is curious that the medical witnesses for the defence, by their own showing, received from the Company more than the amount awarded to the plaintiff.

The medical witnesses for the defence seemed to have utterly ignored the fact of the man having had no defective sight up to the time of the accident; he being at that moment in active employment in sorting letters.

Part II.

Reviews.

ON THE USE OF FORCEPS IN EXTRACTION OF CATARACT; FRANCE'S METHOD.

By A. Poland.

In a former number of this Journal (see Ophth. Hosp. Rep. April, 1859), Mr. France has expressed "an earnest hope that the use of forceps, as advocated and practised by him, may be submitted extensively and impartially to the ordeal of practice." He continues, "it will then be found that by this simple means the section of the cornea may be accomplished with a precision and certainty unattainable before; and the habitual employment of forceps will be recognised as a signal improvement and safeguard in this operation; making it, in expert hands, still surer; in those of the less skilful or less experienced, comparatively sure."

Mr. France has elaborately explained his method in the Guy's Hospital Reports for 1858, and in that volume, as well as in the volume issued in 1860, he has detailed the cases in which his method was carried out, forty-one in number. He says: "It has heretofore been customary to control the motion of the eye while the corneal section is in progress, by the regulated pressure of the fingers; but valuable as is the assistance thus rendered as far as it goes, it falls short of what could be desired in an ordinary case, and often quite fails to keep the irritable, restless globe of a nervous patient even moderately quiet."

Again; "Indeed the importance of fixing an eye effectually can hardly be exaggerated, for from the spasmodic or instinctive movements of the organ mainly arise the accidents to which the operation is obnoxious." Mr. France remarks: "It is not, of course, disputed for a moment that this operation, performed in the ordinary way by competent surgeons is, in the great majority of cases successful in restoring sight. But still, as even in the best hands one or other of these casualties will occasionally take place, and render more precarious, or less perfect (where it does not absolutely prevent) the favourable result, an unobjectionable means of obviating their chief cause is a great desideratum, and

cannot but conduce materially to enhance the average of success."

The entire number of extractions in the method under consideration, up to the date of the issue of the Reports in 1860, were forty-one; and it appears that the necessity of extending the section arose but four times; in the same number of cases the iris was compromised four times (and once doubtfully); and of the whole number of forty-one operations four alone failed,—if an old man of eighty, who died three days after the operation (from bronchitis supervening on heart disease), be excluded from the catalogue. It is rather singular that in every one of the cases of failure the operation had, at the time, been quite satisfactory, as respects the corneal section and the freedom of the iris from injury. So that even these failures, regarded in relation to the use of forceps, contribute evidence in support of the practice.

One more quotation from Mr. France's communication will suffice. "This mode has facilitated the operation in difficult cases in exact proportion to their previous difficulty and risk. This was strikingly evinced in cases 11 and 16; both of which patients had, at a former period, occasioned the utmost anxiety, from the impediments their restless eyes presented to the satisfactory performance of the operation. They, indeed, recovered their sight well, but it was in spite of dangerous obstacles. This year they each recovered the sight of the second eye under circumstances strongly contrasted; that which was so embarrassing before was now effectually surmounted at the very outset, by the simple means we are considering. Still more remarkable in some respects is case 17, that of the sailor, who on two previous occasions had proved so utterly uncontrollable, that I was compelled to desist from the attempt to operate. On the present occasion, with the aid of forceps, after a little preliminary trouble, the globe was brought into and held in a sufficiently favourable position for a good section to be made. Could more convincing evidence be afforded of the value of this appliance?"

Before reviewing or making any comments on Mr. France's method we determined to make a trial, and we have now performed 25 extractions successively on his plan during the past three months, of which 21 were under the immediate supervision of Mr. France himself. In all the pupil had been previously dilated with atropine; in 23 cases the corneal sections were completed at once with Beer's knife, and in 2 only the section required enlargement with the bistoury; in 24 the sections were effected without wound of the iris, but in 1 it was slightly involved. Nothing could be more satisfactory, for these cases certainly confirm the opinions and experience of Mr. France in a very marked manner. We can, therefore, have no hesitation in pronouncing his method as a most valuable addition in the

operation of extraction, but more especially in cases of irritable restless globes of nervous people, where it would seem to demand its application as imperative; at all events, it enables the operator to make his section without any difficulty whatever.

ON THE ACTION OF SANTONINE ON VISION, AND ITS CAUSES.

By M. Franceschi.

Quoted in the Annales d'Oculistique, 1861, p. 199.

Before alluding to the question respecting his views, we will, by way of introduction, premise the subject by the following extracts from other sources.

Pereira's description.

Worm-seed.—The substance kept in the shops, under the name of Worm-seed (semen santonicum, semen civæ, semen contra, semen sementiva, &c.), is erroneously declared by the Dublin College to be seeds (semina) of Artemesia Santonica. A very superficial examination shows that the substance sold under this name consists, not of seeds, but of broken peduncles, mixed with the calyx and flower buds. Furthermore the plant which Dr. Woodville has denominated A. Santonica, is said by Dr. Candole to be A. maritima, vox β suavolens. Martius describes three kinds of worm-seed, but I am acquainted with one kind only, which is imported from the Levant (semen civæ Levanticum). It has been analyzed by both Trommsdorff and Wackenroder, and found to contain volatile and bitter matter. A crystalline substance, called *santonine* ($C^{10}H^6O^2$) has been obtained from it. It is used as a vermifuge, in doses of from gr. x. to ʒss, repeated night and morning, and succeeded by a brisk purge.

The following extract is taken from the Parisian Medical Intelligence of the Lancet, July 20, 1861, p. 74.

The effects of santonine in causing *green* vision have been known for some time, and an oculist of Nantes, M. Guépin, has experimented largely with this drug, hoping to obtain some beneficial therapeutical results from this peculiar property in certain affections of the retina. A case presented by M. Cavasse to the Medical Society of the Seine, last week, further illustrates some of the properties of this drug. A very nervous woman believing that she suffered from worms, purchased from a druggist a drachm of worm-seed, semen contra, in order to rid her bowels of their turbulent inmates. Shortly afterwards colic came on, and chancing to look into the glass she distinctly saw herself pea-green, the fright sufficed to throw her into violent convulsions, and her friends, who believed poison to have been swallowed, rushed in a body to accuse the chemist of manslaughter. Luckily M. Cavasse, well-aware of the properties of santonine, and of its presence in semen contra, was called in, and able to re-assure the terrified family as to the innocency of the medicine to which so much mischief had been attributed. In due time the toxical effects subsided, the green vision disappeared, and the poor patient comforted

by a second look at the mirror, and by the re-appearance of her accustomed tint of complexion, recovered from her panic, morally persuaded, however, that she had narrowly escaped death by poisoning.

M. Franceschi does not admit of an elective action of medicines, and does not recognize a physiological property in santonine, which authorizes its being classed among special excitants of the nervous system. The mode of action of this drug on vision, which has recently been regarded as a particular stimulant of the optic nerve and retina, ought only to be considered, according to M. Franceschi, as an effect of its colouring property.

Pure santonine is white, and becomes coloured under the influence of light. In organs, where it is not exposed to the rays of light, it remains uncoloured; but not so in the visual organ, where it is submitted to the action of light; hence results the alteration of vision, which is required to be exercised through a medium coloured by santonine.

M. Franceschi bases this opinion on the following experiment;—he took two grains of powdered santonine and dissolved them in an aqueous vehicle, and this he allowed to colour itself until the next day, when he administered it to himself internally, but no modification of vision ensued; there was no particular colouration of the urine. The same dose of santonine was again taken, but previous to its becoming yellow by exposure to light; this he found to develop in a very marked manner the phenomenon of colouration of objects: the effect lasted several hours, and was accompanied with slight dilatation of the pupil; the urine was clear at the moment of its emission, but soon became perfectly of a yellow colour, and even took a greenish tint.

The yellowish colouration, to which the author had submitted the santonine by exposure to light previous to administration, seemed to have sufficed to take away from this drug the special virtue which has been attributed to it. This alkaloid, then, possesses solely its colouring action on the visual organ, because this organ is the only one which offers the conditions of transparency to the light, an indispensable condition to this mutation of colour.

This phenomenon is not associated with any symptom indicative of any action whatever on the nervous system. No doubt that madder and rhubarb produce analogous effects, these substances, as with santonine, penetrating deeply in the economy and modifying the colour of the urine; but these two substances are already coloured previous to ingestion, while santonine is only coloured at that part of the organism, where it is submitted to the action of light. The ingenious experiment of M. Franceschi appears worthy of being repeated, and if from new proofs the same results occur, therapeutics will probably find the means of obtaining from santonine its vermifuge properties, deprived of the inconvenient colouring action on vision.

Part III.

Minor Contributions, etc.

CASE OF CONGENITAL ABSENCE OF THE IRIS IN BOTH EYES.

REPORTED BY

Mr. George Lawson, F.R.C.S.,

Clinical Assistant to Mr. Bowman.

G. B., æt. 13, an eight-months' child; the youngest but one of six children; a strong, healthy, intelligent looking boy. He joins freely in all games, and has learnt to read. He complains that after reading for about one hour his sight becomes dim, but after a short rest he is able to continue his reading.

He has no iris in either eye; each eye presents one dark aperture, the size of the cornea. There is continued oscillatory movements of both eyes. He 's unable to converge both eyes simultaneously, as, when attempting to do so, in looking at a near object, the right eye converges to a certain point and then rolls outwards.

He looks at objects, and fixes almost entirely with the left eye. There is a tendency to turn both eyes upwards, so as to shelter a large portion of the corneæ beneath the upper lids. He finds no inconvenience from the glare of ordinary daylight, and he bears without flinching or complaining of discomfort the ophthalmoscopic light.

With his *left* eye he can read No. 4 type, and tested with that type his near point = 2 inches, far point = 5 inches. With the same eye he can read No. 10 type at 2 inches and at $7\frac{1}{2}$ inches; and No. 19 type at $3\frac{1}{2}$ inches and at 45 inches distant.

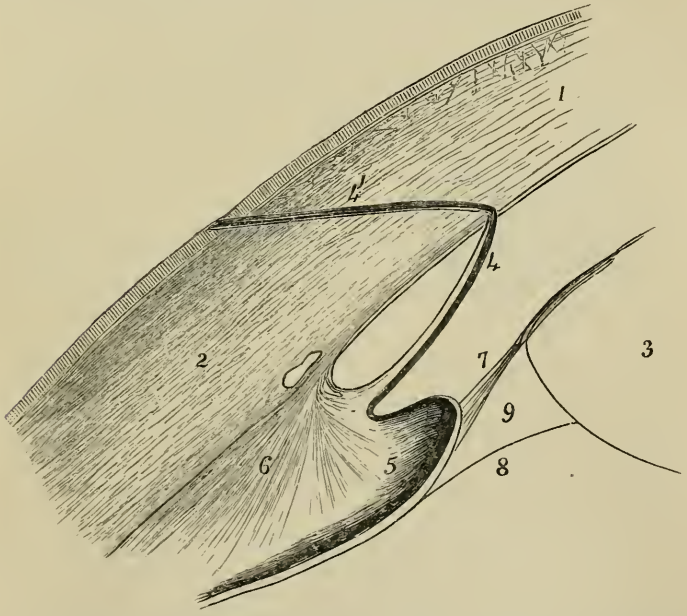
With his *right* eye he can only make out letters of No. 8 type, which he can read at 2 inches and at $6\frac{1}{2}$ inches distant. Examined with the ophthalmoscope, the margin of the lens in each eye is very distinctly seen. In the *right* eye there are patchy opacities in the lens. In the *left*, the lens and humours clear.

In both eyes the optic nerve is very small, white, and indistinctly defined, imperfectly developed. The retinal vessels very small and thready.

DISSECTION OF THE CILIARY REGION IN A CASE WHERE IRIDECTOMY HAD BEEN PERFORMED.

By J. W. Hulke.

In the absence of any published account (so far as I know) of dissections of the ciliary region and the adjacent structures, after the performance of iridectomy, a short statement of the dissection of these parts in case 2 seems worthy of a separate record; more particularly since the appearances disprove the correctness, at least in this instance, of conjectures which, in the absence of exact knowledge, have been hazarded, by some, respecting the structures supposed to be divided in this operation.



1. Cornea. 2. Sclerotic. 3. Lens. 4. Iris. 4′. Iris in scar of sclero-corneal incision. 5. Ciliary process. 6. Ciliary muscle. 7. Suspensory ligament of the lens. 8. Hyaloid membrane, forming the posterior wall of the canal of Petit.

The diagram, constructed after a study of several sections, gives a clearer idea of the direction of the incision, and of the relative situation of the parts, than a verbal description alone

would convey. The scar of the sclero-corneal incision contained a breadth of iris (4′) equal to the length of the incision, the inner lips of which opened into the anterior chamber, $\frac{1}{16}$th of an inch in front of the ciliary attachment of the iris. In consequence of the chamber having been opened at this point, the iris had not been completely excised, a belt of it slightly broader than $\frac{1}{16}$th of an inch stretched between the ciliary attachment of this organ, and the inner lips of the corneal wound. The lens occupied a position nearer to the cornea than natural, the side corresponding to the iridectomy was most advanced. The suspensory ligament was stretched forward in such a manner as to be applied to the extreme edge of the lens before reaching its insertion. Together with the posterior wall of the canal of Petit, it formed the only barrier between the vitreous and aqueous humours, in an extent equal to the gap in the iris.

It will be seen that the pillars of the iris, as well as that other division of the posterior elastic lamina of the cornea which acts the part of a tendon of origin to the ciliary muscle, and this muscle itself, were, so to say, remote from the lines of the incisions, and could not have been concerned in the iridectomy.

ACUTE CHOROIDITIS, EFFUSION OF SERUM AND BLOOD STRIPPING THE RETINA FROM THE CHOROID; WITH RUPTURE OF THE COARCTED RETINA NEAR THE FORAMEN OPTICUM.

Whilst complete detachment of the retina from the choroid is very commonly met with in association with copious effusions of serum and lymph from this latter coat, the present is the first of a very considerable number of dissections of human eyes, in which I have found the coarcted retina torn through near sclero-choroidal foramen. I have, however, seen this not unfrequently in horses' eyes.

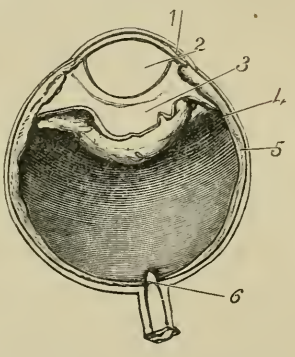
E. M., æt. 10, was admitted into the Royal London Ophthalmic Hospital June 16, 1860, with acute inflammation of the left eyeball, of three weeks' duration. There was extreme pain in the eyeball, congestion and œdema of the conjunctiva of the globe, redness of the sclerotic, and turgescence of the ciliary veins. The ciliary sclerotic in front of the superior rectus was stretched and thinned, and had a small blue staphyloma, the size of a mustard-seed. Below, and at the outer side of its centre, the cornea was nebulous and pitted with the scar of a former ulcer to which the iris was adherent, the pupil being small, pear-shaped, and drawn towards the scar, which partly masked it.

Through the upper part of the pupil, a yellow gleam, apparently deeply seated in the lens, or just behind this, in the vitreous humour, was visible. The aqueous humour was cloudy.

The retina was quite insensible, but I was told that, although for a long time vision had been very defective, quantitative perception of light was not lost till the commencement of the present attack, which began suddenly with great pain.

The deep seated yellow gleam, coupled with the sudden occurrence of acute choroiditis in a child of this age led me to suspect carcinoma, rather than a simple extension of the inflammatory process from the ciliary region, where its sequelæ were visible in the ectasiæ, to the choroid. On this account chiefly I advised the removal of the globe, which, whatever the nature of the disease, was wholly lost, and excised it the same day.

The appearances displayed in its dissection are shown in the accompanying somewhat rude diagram.



The iris coated with lymph, 1, was pressed against the cornea by the lens, 2, which had been thrust forcibly forward by pressure from behind. The retina, 4, entirely separated from the choroid as far as the ora serrata, and torn through near the optic nerve, was gathered up and pressed against the back of the lens, from which it was only separated by a stratum of yellowish, translucent vitreous humour, 3. A little cone, half a line high, 6, projected from the sclero-choroidal foramen; it was evidently a small shred of retina which had preserved its continuity with the optic nerve. The space between the displaced retina and the choroid was filled with serum stained brown by much disintegrating blood. Fresh unaltered blood discs for the most part cohering in rolls, were also present in large numbers. The epithelium of the choroid was swollen, the cells were distended and more or less globular. In small scattered spots, of from one-quarter of a line to half a line in diameter, the elastic lamina was raised by nests of exudation corpuscles, and here the epithelium was ragged, its cells broken, or absent. The stroma of the choroid, 5, was distended with serum, particularly that part of it known as the lamina fusca. The ciliary processes and ciliary muscle were also œdematous.

These appearances show the supposition of carcinoma as a cause of the choroiditis to have been incorrect. The deep-seated

yellow gleam was the reflection from the lymph-infiltrated vitreous humour.

The situation which the detached retina occupied, the way in which it was gathered up against the lens, and the advance of this and the iris towards the cornea, all spoke for the existence of great fluid pressure from behind; and that the source of this pressure was a copious effusion of serum by choroid, was clear from the inflammatory signs presented by this tunic.

The very remarkable tearing-through of the retina near the optic nerve may have been a consequence of the sudden application of this pressure, which having first thrust the retina towards the axis of the globe at the expense of the vitreous humour, snapped through the funnel-like stem of the figure that it assumes under circumstances before this had time to yield and stretch. Softening of the retinal tissues, predisposing them to tear, and vital contraction of the organised products of inflammation in the vitreous humour pulling on the inner or anterior surface of the retina may have been joint factors with the posterior or external pressure.

CASE OF CHOROIDITIS FROM A PENETRATING WOUND. FORMATION OF CONNECTIVE TISSUE AND BLOOD-VESSELS IN THE VITREOUS HUMOUR.

In the thirteenth number of these Reports, page 73, I recorded a case of posterior staphyloma ending in acute choroiditis, and figured exudation corpuscles and large brood-cells from the vitreous humour, which I believed to have been evolved from the nuclei which are constantly found on the hyaloid membrane in the eyes of adults, and which are regarded by some persons as vestiges of the fœtal cellular structure of this humour. The proof of this origin of the large brood-cells lay, in the observation of intermediate states, through which the transition from the persistent nuclei of the hyaloid membrane to the most colossal brood-cell, was readily followed.

The identity of the free corpuscles with what are generally known as exudation corpuscles, rested on the similarity of their physical and chemical characters; and the close resemblance of the free corpuscles to those within the brood-cells left no doubt of their identity with these. Though I carefully searched for them, I could not detect any blood-vessels; had they existed, I must have seen them in so little complex a tissue as the vitreous humour, notwithstanding the cells and fibres with which it was

loaded, and as I did not see any, I think myself justified in asserting their absence. Here, then, in the absence of blood-vessels, processes were in active operation, identical with those which are part of inflammation, and for which vascularity is said to be a necessary condition by those pathologists who deny the occurrence of inflammation in the so-called non-vascular tissues, as for instance in cartilage and the inner coat of large arteries and veins. It follows that the presence of vessels is not a necessary condition for the occurrence of inflammation in the vitreous humour, and therefore not essential to its occurrence in other tissues similarly void of vessels.

In the case which I now record, in addition to fibrillation and endogenous cell-formation, the further evolution of the inflammatory products into connective tissue and blood-vessels was observed.

C. R., æt. 50, a Swede, was admitted into the Royal London Ophthalmic Hospital Dec. 24th, 1858, having six weeks previously received a wound of the left eye from a chip of iron which flew off a bar of iron that he was hammering. The chip was removed by a surgeon one quarter of an hour after the occurrence of the accident. On his admission, the situation of the wound was marked by a scar in the margin of the cornea, just below its horizontal meridian, running for a short distance backwards into the ciliary region. Prolapsus iridis had happened, and the pupil was small, pear-shaped, and drawn towards the scar. The aqueous humour was yellowish; the lens opaque. The conjunctiva was red, and slightly œdematous; and the sclerotic was congested. The globe was very soft, squared by the musculi recti, and its size was one-third less than that of the other. The pain in this eye had been intolerable, but was then less severe. Perception of light was quite extinct. The right eye had lately become intolerant of light, congested and painful; and its vision was failing; no smaller type than No. 11 could be read.

Under these circumstances, the left eyeball was excised, and this was followed by perfect recovery of the sight.

Dissection of the extirpated eyeball.—The anterior chamber was almost obliterated by the advance of the iris, pushed by the swollen opaque lens towards the cornea. The ciliary muscle and ciliary processes were œdematous and infiltrated with exudation corpuscles. The choroid also was œdematous; the web of the lamina fusca was distended with serum, and so unravelled that the ciliary nerves were as conspicuously displayed as by a patient dissection. The capillaries were dilated, and in their immediate neighbourhood, between them and the larger vessels, there was a thin and interrupted stratum of exudation corpuscles.

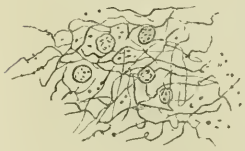
Though I do not know what significance to attach to it, it is perhaps worth recording that the multipolar cells contained much more pigment than is usual in persons of such fair complexion (the patient was a Swede). The elastic lamina was wrinkled, as if its shrinking had not kept pace with the diminution of the globe.

The retina, completely separated from the choroid, had the figure of a bulb, very slender and tapering behind, where it joined the optic nerve, and expanding near the equator to be attached circumferentially at the ora serrata. The slender posterior portion of the connected retina was folded longitudinally, so closely that transverse sections showed it to be a solid pillar; but the expanded portion in front inclosed some much altered vitreous humour, which I shall describe presently.

Vertical sections made at various parts showed that the retina was much thickened (the average of several measurements at the equator was $\frac{1}{54}$ of an inch). Its component structures seemed to be separated and unravelled, as if in consequence of œdema. The radiating fibres were greatly elongated, and, at the same time, stouter than natural; they were quite colossal. The ganglion cells were very opaque, and the opticus fibres were finely granular. The space between the retina and choroid was filled with amber-coloured serum.

The vitreous humour was solid and opaque, milky-white, friable near the back of the lens, but structure tough, particularly behind, near the contracted part of the retina, where it inclosed a small blood stain, quite unconnected with the retina. Sections through the tough vitreous humour perpendicular to the retina showed a plaited arrangement of the hyaloid membrane, the general arrangement of the plaits being a converging one towards the axis of the globe. The plaited hyaloid membrane was clothed with a web of delicate curling fibres, entangling exudation corpuscles, fig. 1, and was also finely powdered with opaque molecular matter. There were also present large brood cells, with endogenous growths; these were obviously the metamorphosed persistent nuclei of the hyaloid. The friable portion of the vitreous contained the same elements, only the corpuscular predominated over the fibrous. The very tough posterior part of the vitreous, which was stained with blood, consisted of a closely-woven connective tissue supplied with vessels, fig. 2. I could not trace their continuity with those of the retina, but the relation between

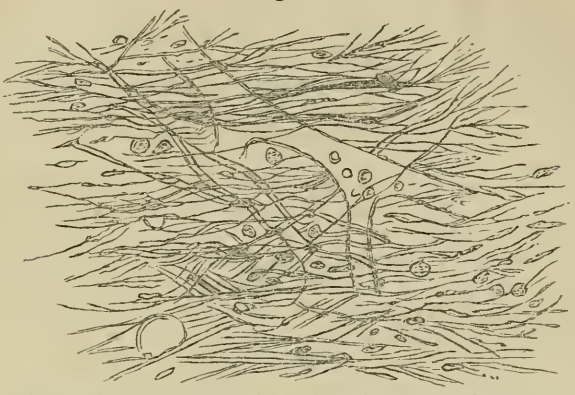
Fig. 1.*



* Exudation corpuscles and fibres from the vitreous humour.

the vitreous humour and the coarcted retina leaves no doubt that a communication existed.

Fig. 2.



Connective tissue and capillary from the vitreous humour.

A SERIES OF CASES OF CARCINOMA OF THE EYEBALL.

By J. W. Hulke.

Case 1.—*Melanotic and Medullary Cancer.*

A. G., æt. 50, was admitted into King's College Hospital, under Mr. Bowman, January, 1837, with carcinoma of the right eye-ball. He stated that twenty years before, this eye had been very acutely inflamed and had afterwards shrunk and been quite blind; and that it had since that time been frequently inflamed. Two or three months before his admission into King's College Hospital, the shrunken globe had increased in size, and had become red, then two small projections like "black currants," had formed in the situation of the cornea. These had burst, discharging, at first, a bloody serum; but a fortnight afterwards a fungus protruded through the opening, and this had grown so rapidly that at the time this note was made, Jan. 24th, it formed a large nodular, warty tumour, which projected between the eyelids, preventing their closure, distending them greatly and everting the upper one. The surface of the tumour was coated with black crusts of dried blood, from beneath which a fœtid sanies constantly oozed. The movements of the eyeball were but little limited. There were no symptoms of a backward extension of the growth within the skull, no cachexia, and no evidence of carcinosis of the thoracic or abdominal organs. The cancerous globe was excised by Mr. Bowman, who found that the tumour had stretched

backwards into the apex of the orbit, and that it was not possible to remove the whole of it. The patient rapidly recovered from the operation, and left the hospital. Aug. 12th I received information that he had died two days before. His friends would only permit the belly to be opened. The surface of the liver, particularly its left lobe, was studded with melanotic and medullary nodules, and the whole organ was enormously enlarged by masses of both these varieties of cancer. The kidneys and spleen were healthy. The eyelids were bulged by a melanotic mass filling the orbit.

Dissection of the eye-ball.—The tumour and eye-ball were divided by a vertical section, from front to back, passing by the side of the optic nerve.

The interior of the globe was filled with a cancerous mass, continuous anteriorily with the external tumour. It consisted of two very dissimilar portions, one deep, brownish-black, the other resembling in colour and consistence the grey matter of the brain. In some situations the transition was sudden, whilst in others the black and grey elements blended.

Although to the unaided eye so different in rough characters, the minute structures of the black and the grey portions were identical; both alike consisted of free nuclei and large brood-cells of circular, fusiform, and multipolar shapes; only in the black portions these elements were charged with pigment.

The sclerotic in the greater part of its extent, was unimplicated by the cancerous growth, but posteriorly near the insertion of the optic nerve its continuity was destroyed at several points, where the cancer had escaped from within the globe and formed small nodules lying along the trunk of the optic nerve, in the angle between it and the back of the globe. The cancer had also made its way out behind the insertion of the Musc. Rect. Int., in which situation the sclerotic was split by pellets of melanotic matter. A thin web of choroid could be traced lining the sclerotic. No vestige of the retina was discoverable. The sheath of the optic nerve was not involved, but the nerve itself outside the sclerotic was infiltrated with cells identical with those of the grey portion of the cancer within the globe.

The lens and cornea were absent. Of the parts lying in the ciliary region, I find no other note than that a scale of true bony tissue was found here, containing laminæ and vascular canals.

Case 2.—*Melanosis of Choroid, Iridectomy, Excision.*

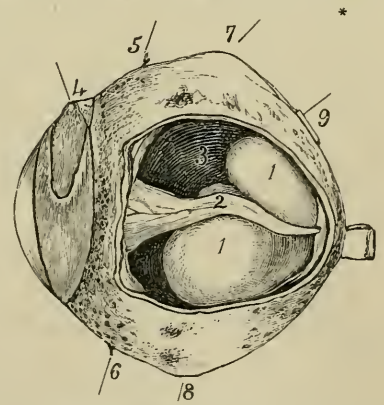
A lady, æt. 62, in Feb. 1860, found the sight of her right eye which had always been excellent begin to fail. The skin of the right brow, and eyelids, was deeply bronzed, and the sclerotic of this eye was singularly mottled with rich brown spots; these, she said, were congenical peculiarities. Her complexion also was very dark, and her hair jet black.

On the 4th of May following, she consulted Mr. Bowman, who found the right eye quite blind; its pupil widely dilated, its lens greenish, but its tension normal. With the ophthalmoscope, a "large black tumid rise in the fundus, and at the yellow spot and at the outer and lower sides of this, extensive detachment of the retina," were observed. "The effusion between the choroid and sclerotic, as well as under the retina—perhaps also melanosis," was diagnosed.

In June the tension of this eye became excessive, and this was accompanied with violent pain. At this time also the left eye became weak, and irritable, its sight somewhat dim and troubled with motes. Iridectomy was now performed on the right eye, a large segment of the upper part of the iris being removed. This reduced the excessive tension, and relieved the intolerable pain, but only for a short time. The return of these symptoms in an aggravated degree, together with the occurrence of injection of the sclerotic, and congestion and chemosis of the conjunctiva, favoured so strongly the presumption of intraocular cancer, that excision of the now completely spoiled organ was performed July 25th.

The following description is extracted from my memorandum of the dissection of the eyeball:

The sclerotic is mottled with purplish spots, which consist of a web of brownish-black pigment, inverwoven with small vessels of a venous rather than capillary character. These spots abound in the ciliary region, and around the posterior pole, but occur sparingly in other parts of the sclerotic. The dimensions of the globe are as follows: the antero-posterior diameter $12\frac{5}{6}$ lines; the vertical diameter at the equator 14 lines; and the transverse diameter at this part $11\frac{4}{6}$ lines. The insertion of the tendon of the Musc. Rect. Sup. is $4\frac{4}{6}$ lines distant from the cornea, that of the Musc. Rect. Inf. and Musc. Rect. Ext. $3\frac{1}{2}$ lines; and that of the Musc. Rect. Int. $2\frac{5}{6}$ lines. The greater distance of the insertion of the superior rectus from the cornea is due to the



* Diagram of a melanotic tumour of the choroid. 1. The tumour. 2. The coarcted retina. 3. The choroid. 4. Iridectomy scar. 5. Tendon of Rect. Sup. 6. Ditto of Rect. Inf. 7. Upper retina. 8. Lower ditto. 9. Tendon of Obliquus Sup.

stretching of the iridectomy-scar, in consequence of which the upper part of the margin of the cornea is carried forward. The excess of the vertical over the horizontal diameter of the globe, at the equator, is caused by an oval bulge of the sclerotic between the insertions of the Musc. Rect. Sup. and the Musc. Obliquus Sup., and by a smaller, more circular bulge behind the insertion of the Musc. Rect. Inf. In addition to these there is a third and larger ectasia, a general expansion of the lower and outer quadrant of the posterior hemisphere of the globe. From the choroid corresponding to this large ectasia, a nodular melanotic cancer projected towards the centre of the globe. Traces of the hexagonal epithelium and elastic lamina occur on its inner, and of multipolar pigment cells from the choroidal stroma, on its outer surface.

The retina completely stripped from the choroid stretches in the form of a slender cone from the optic nerve-entrance to the back of the lens, whence it is reflected outwards to the ora serrata. Posteriorly, it grooves the cancerous tumour, but is clearly separable from it. A minute examination of its structures was not made, it contained no melanotic deposits visible to the unaided eye, but the optic nerve where it had been divided outside the sclerotic was blackish and infiltrated with melanotic cells.

The choroid contained so much pigment, that it was absolutely black, and completely intercepted the transmission of light. Its epithelial cells were swollen, rounded, and crammed with pigment grains. The elastic lamina was abundantly studded with large colloid globes. The amount of pigment present prevented a satisfactory examination of the chorio-capillaris. The space between the detached retina and the choroid was filled with a chocolate-coloured serum, containing flocculent blood clots, and blood discs in various stages of disintegration.

Case 3.—*Medullary Cancer, probably commencing in the choroid.*

George N., one year and ten months old, a merry, healthy-looking little fellow, was admitted into King's College Hospital October 9th, 1856, under the care of Mr. Bowman, with cancer of the left eye.

The mother, an intelligent person, had first noticed a bright glare in this eye (it seemed to her, she said, "as if she could look right into the child's head,") ten months before, at which time she thought the eye was blind. Two or three months afterwards a "white spot" appeared in the pupil, probably opacity of the lens. About a month after this the cornea burst, discharging, at first, a transparent, limpid fluid, but, on the next day, some blood. This was followed by a protrusion of a fungus which, at the time of the child's admission into the Hospital, formed a conical mass, projecting two inches through the

fissure of the lids, its surface was rugged and sloughing, and bled when touched. The eyelids were much distended, and completely turned inside out. The child was not in pain, and slept well. Notwithstanding the size of the tumour, this eyeball so readily followed the movements of its fellow, that it seemed probable the growth had not made its way through the back of the eyeball into the orbit, and therefore on the 11th, excision was performed by Mr. Bowman, who divided the optic nerve about one-twelfth of an inch from its insertion in the sclerotic, and as it then appeared that the cancerous growth reached farther back along the nerve, he divided this a second time close to the apex of the orbit. The rather free bleeding was checked by packing the orbit with a strip of lint, which was removed about an hour afterwards. The child's recovery from the operation was retarded by an attack of scarlet fever. In the beginning of November it started in its sleep, had convulsions, and died on the 9th of the month.

At the autopsy the cut extremity of the optic nerve, covered by granulations, was seen in the apex of the orbit as a swollen, mushroom-like projection. Traced backwards through the bony foramen immediately within the skull, the nerve (the left one) was almost lost in a tumour about the size of a walnut, closely resembling in colour and firmness the grey, cerebral matter. In front, this tumour was continuous through the spheroidal fissure with the cancerous mass in the orbit, and posteriorly it involved the optic chiasma. The right optic tract was spent on its under surface, and the left optic tract and the right optic nerve were also implicated in the tumour, but in a less degree. The elementary structures of this tumour resembled those of the cancerous mass within the eyeball.

Dissection of the excised eyeball.—This was distended by a greyish, brain-like mass, which had burst through the cornea and constituted the large projecting tumour in front, the surface of which was coated with a tough, horny crust of dried blood and ichor. Behind the equator, the sclerotic, though attenuated by over-stretching, was unbroken as far as one-eighth of an inch from the optic nerve, where it was perforated at several points by cancerous tubers, which crept backwards along the outside of the nerve. Between the equator and the insertions of the musculi recti, the sclerotic had disappeared, and the cancer had made its way out and spread backwards between the outer surface of the globe and the muscles; in front of this, a ring completely severed from the rest, lined with widely separated and ragged ciliary processes, had been borne forwards by the advancing cancer. The edges of this zonular gap were thinned and lost in the cancer, and the vascular foramina in their immediate neighbourhood were greatly dilated. The principal microscopic elements of the growth were large brood-cells and free nuclei infiltrated in a scanty fibrillated stroma.

Case 4.—Medullary Cancer of the Ciliary Muscle, Ciliary Processes and Choroid. Acute Choroiditis.

Fred. S., æt. 33, whose appearance was cachectic and indicative of great suffering, came to the Royal London Ophthalmic Hospital, July 27th, 1861, with acute inflammation of the right eyeball. The present attack had lasted a fortnight, but he said that the first occurred two years and a half before; since which he had repeatedly suffered in the same way. The cornea was opaque from infiltration of its tissue; softened and bulging below the centre. The conjunctiva bulbi was red and œdematous, and there was very great injection of the sclerotic. On raising the upper eyelid, which was very red and swollen, a purplish swelling was observed on the globe, behind the upper and outer quadrant of the ciliary region. The globe was soft.

The left eye was intolerant of light. The visual field was good, and No. 1 could be read.

The right eyeball being irretrievably spoiled and a source of much distress, its removal was recommended, more particularly as the presence of the external swelling led me to suspect cancer. On the 30th I excised it. The inflammatory matting together of the conjunctiva, fascia oculi, and muscles, made the operation rather tedious. Three days afterwards the man was made an out-patient.

I am indebted to Dr. Bader for the following note of the dissection: Excepting in front of the equator at the lower part of eyeball, the retina was separated from the choroid and thrown inwards towards the axis of the globe. In the posterior hemisphere this displacement was chiefly caused by fluid (serum exuded from the choroid), but to some extent also by a medullary cancer, which apparently commencing in the ciliary region, formed the swelling visible externally, filled the upper half of the anterior and reached into the posterior hemisphere. The cancer seemed to be infiltrated in the ciliary muscle, processes and choroid. The displaced retina was slightly opaque, but its structure could be made out. The vitreous humour was yellowish and translucent, infiltrated with serum. The lens was opaque and pressed forwards, bearing the iris with it against the cornea.

Case 5.—Medullary Carcimona of the Choroid.

Wm. C., æt. 6, a healthy-looking, intelligent boy, was sent into King's College Hospital, September 12th, 1860, from the country, with the meagre history, "that four years previously the sight of his left eye had been supposed defective, and that for some months this eye had been enlarged."

At the time of his admission into the Hospital, the eyelids were distended by a large globular mass, which also projected

between them. In the centre of this mass the outlines of the globe were just discernible; the place of the cornea was occupied by a dry buff-coloured scab. The conjunctiva bulbi was very thick and fleshy, and not ulcerated. The whole mass followed slightly the movements of the other eyeball. There were no brain symptoms indicating an extension of the cancer within the skull. The child's health seemed unaffected, it was cheerful and free from pain. The diagnosis was medullary cancer, which had burst through the back of the eyeball, filled the orbit behind it, and was then thrusting it forwards. The improbability of being able at this period completely to extirpate the cancer, when the tissues outside the globe at the back of the orbit, were implicated in it, and the consequent certainty of an immediate return, contra-indicated excision (though this had been justifiable even at this time, had there been hemorrhage or much suffering, which there was not), but the parents, to whom the nature and termination of the disease had been plainly stated, begged me so urgently to endeavour to prolong their child's life by attempting to excise the cancer, that I reluctantly yielded to their entreaty.

The child having been narcotized with chloroform, the fleshy conjunctiva was reflected from the globe by a circular incision behind the place of the cornea, and the muscles were divided one by one. Behind the equator the outline of the globe was lost in a tuberous mass which filled the back of the orbit; this was cut through with scissors, guided by the left forefinger, as near the apex of the orbit as possible, and the whole lifted out. Space having been gained, a portion was felt to have been left quite at the apex, around the optic nerve. This was cut short off at the foramen opticum, and the apex seemed now to be quite clear. The bleeding was not very great. The orbit was plugged with a long strip of lint, which the house-surgeon was told to withdraw in a few hours, when the vessels might be supposed to be sealed with coagula, and before inflammation set in. The wound suppurated and healed quickly, so that the child was sent home on the 22nd, at which time there was no appearance of a return of the cancer.

Nov. 28th.—The child was brought back with a large tumour, the size of a small orange distending the eyelids. It was drowsy, and awoke starting and screaming. Finding that no further operation could be done, the parents removed it from the Hospital.

Dissection of the excised eyeball.—The cornea was opaque and flattened, but the spherical shape of the sclerotic was unaltered. Around the optic nerve all the tunics had disappeared, leaving a large circular aperture through which a pinkish-grey vascular tumour had protruded from the interior of the globe. The tumour had filled the apex of the orbit, and then increasing in the direction of least resistance, had extended forwards, pushing

the globe (which was set in it as an egg is in an egg-cup) before it. The interior of the globe was filled by the tumour, the axis of which was traversed by the contracted retina, detached from the choroid. The vitreous humour had disappeared. The lens was thrust forwards and moulded to the cornea. The microscopic element of the new growth were those of medullary carcinoma.

CASES OF REFLEX (?) AMAUROSIS WITH COLOURED VISION.

By J. Hughlings Jackson, M.D., M.R.C.P. London,

Clinical Assistant at the Royal London Ophthalmic Hospital, Assistant Physician to the Metropolitan Free Hospital, and Physician to the Islington Dispensary.

The first of the following cases is interesting, not only pathologically, but also in relation to a medico-legal question recently raised in a court of law; and it is the more valuable that not having occurred after any injury, there was no room for suspicion of unfairness in the description of the symptom by the patient,—a symptom which, even after the use of the ophthalmoscope, must remain subjective. Before I relate the case, however, I may mention that the medico-legal question was raised in a recent action brought by a corn-dealer against a railway company, to recover damages for defective vision following on injuries received in a railway accident. The defect was stated to be coloured vision (yellow), so that the plaintiff was unable to distinguish yellow and white wheat—both looked yellow. In this case there was, I believe, no subjective symptom, either to the eye, unassisted, or aided by the ophthalmoscope.

A man, aged 39, admitted as an out-patient under Mr. Poland, came under my care on June 1st, for impaired sight, which had commenced gradually three months before. He could not read the largest print, and was led to the hospital. He had no pain, and had had none from the first. He had been temperate, and, except for the defect of sight and a few nervous symptoms, to be presently alluded to, was quite well. His eyes were examined by the ophthalmoscope by several observers, and both the optic discs were found to be anæmic. There was no trace of choroidal or iritic inflammation. The interesting point in this case, however, was, that the patient saw everything as if yellow; it mattered not what colour they might really be—they were all yellow. Again, this pathological condition was rendered interesting by the fact of his business being interfered with from the first, not merely by loss of the power of seeing, but by the objects being seen coloured. Thus he might have

pursued his business, of buying wood, in spite of considerable impairment of vision, if the element of colour did not come into play; *but he was unable to distinguish red-pine from yellow-pine, both looking yellow.*

In this case there was, as the ophthalmoscope showed, disease of the optic nerves, without any evidence of disease of the other structures of the eye, but there were symptoms which led me to believe that changes were also going on at the same time in other parts of the nervous system. These symptoms were only, however, temporary trembling of the legs, without evident cause, lasting for some time, a jerking up of the left leg, and a sensation of "pins and needles" in the toes, trifling as effects, but serious as signs of impaired nutrition of certain parts of the nervous system. I believe that they were signs of impaired nutrition in other parts of the nervous system coetaneous with—and not causing—the loss of sight. I suppose (how produced is another matter), that the anæmic condition of the optic discs, signifies impairment of the blood-supply of the whole retina, and that this patient's loss of the power of seeing and also of receiving a correct impression from light admitted into his eye, was due to some change, more or less permanent, in the retina itself, consequent on impaired nutrition, and yet in many cases of anæmic optic entrance there is no history of coloured vision. In many, however, there is; and red, and sometimes green "fogs" are mentioned. I have notes of a case of one patient who first saw a blue cloud before his eyes, which subsequently became black, or as we may say of all these cases that of the three colours which compose white light, one only is seen, and then later none, *i. e.*, when the "cloud" becomes black. In this case it was clear that there was no other disease of the eye than atrophy of the optic nerve. In fact, when he first came, several observers considered that the fundus was normal; subsequently, however, there was no doubt that the optic discs were in the condition commonly called atrophy.

In both these cases there was another symptom of interest, viz., that the sight varied remarkably. The patient who saw yellow said, that one morning, after having been excited, his "sight totally left him," and that in consequence, for a quarter of an hour, he could not see *at all.* He found, too, that his sight varied in the day. It was better in the morning, worse in the middle of the day, and better again late in the afternoon. In the other case, the patient, for a short time, recovered his sight entirely. He was a very intelligent man, and he described circumstantially what he saw, and what he was doing. This only occurred twice, and only lasted for about half a minute. I have said that I believed the loss of sight was due *directly* to what the ophthalmoscope showed, viz., to local disease in the retina, and this from impairment of its circulation, from contrac-

tion of the blood-vessels, the result, as I believe, in all these cases, of some excentric irritation—the *indirect* cause of the blindness. I admit that in neither of these cases was I able to fix on even a possible cause of irritation; but in other cases, in which the condition of the optic discs was similar, I have had more certain evidence that some excentric irritation existed. In one case, from this condition of the optic entrance, I considered the diagnosis I had made of disease of the cerebellum was rendered certain, and such proved to be the case. Again, although this feature also is absent in this case, the suddenness of the attack is some evidence, I think, that this affection, like other forms of paralysis, is due to excentric irritation; and then, again, the sudden alterations in the sight, would, I think, show that there could be no organic change *par excellence*, either in the retina or in the cerebral part of the organ of vision. I have found that these alterations take place only in the beginning of the affection. Of course, later, the continued defect of blood-supply produces permanent loss of function. We all admit cases of paralysis of a leg or arm in a child to be very often reflex, occurring *suddenly*, the paralyzed limb being cold, and ultimately wasting, the cause being probably, not a lesion between the nerves of the limb and the central nervous system, but some excentric irritation acting on its blood-vessels. Then in other cases of reflex paralysis, as reflex paraplegia, sudden alterations of power are often well-marked. I should say then, that in this form of amaurosis there is some excentric irritation acting on the vessels of the optic nerve and retina producing anæmia, and thus more or less loss of function. Dr. Brown-Sequard tells me, that he has collected more than sixty cases of amaurosis connected with diseases of the cerebellum, produced, as he believes, by reflex action. The two following quotations from Dr. Spillan's translation of Andral's Clinique Médicale, will be interesting in relation to this subject.

"With respect to the fourth case published by Dr. Michelet in his Thesis, it is deserving of all our attention.

"This was the case of a girl, eighteen years of age, who two years before her death had had an attack of apoplexy, the result of which was *amaurosis without any other paralysis*, and habitual headache. An apoplectic cavity of long standing was found in the right lobe of the cerebellum." This could but have caused pressure upon the corpora quadrigemina. Speaking of a case of blindness, associated with hemiplegia consequent on disease of the cerebellum, he writes: "With respect to the blindness, it seems at first that it has nothing to do with disease of the cerebellum, and yet this case is not the only one in which different affections of the cerebellum have been accompanied by a loss of vision. May this fact be explained by the anatomical relation established between the cerebellum and the tubercula

quadrigemina by means of the prolongations known by the name of the processus e cerebello ad testes."

In reference to the case I have related, I have only to add, that the patient who had the yellow vision is now almost well. He took iodide of potassium for some time, and later tincture of nux vomica in ten minim doses. Whether, however, his recovery is due to it, or to the iodide, or to neither, I do not pretend to say. If the theory of this case is the correct one, strychnine, which causes dilatation of the blood-vessels, should be the remedy for this form of amaurosis. Of course I do not pretend that there is any great novelty in the disease, the theory, or the remedy, although I do not know that this special form of amaurosis and the ophthalmoscopic condition have been *both* before linked to the theory of reflex paralysis. To show how little credit I pretend to claim, I insert the following quotation from one of Dr. Brown-Sequard's Lectures in the Lancet for July 13, 1861:

"*Amaurosis.*—This symptom may depend upon a lesion of the tubercula quadrigemina, or, of course, of the retina and any part of the length of the optic nerves; but it may also be the result of two other and distinct kinds of causes. It may be due to the effect of an irritation starting from any sensitive nerve in the body, or from certain parts of the nervous centres. An amaurosis in such cases seems to be the manifest result of a reflex action. I have seen it produced in that way in animals after an injury to the spinal cord. I have collected sixty-two cases of disease of the cerebellum in which it has been most likely produced in the same manner. My friend, Dr. Davaine, in his excellent work on Worms, mentions twelve cases in which amaurosis was due to worms. An irritation of the frontal nerve may bring on a reflex amaurosis, which is quickly cured after the division of the irritated nerve. Neuralgia of the face not rarely causes a reflex amaurosis. I have seen three cases of that kind, and others are on record. It is known that a simple irritation of the nerves of the stomach in gastralgia may produce a reflex amaurosis. This paralysis of the optic nerve, like all other reflex paralyses, is characterized by the following features: 1st, it, of course, only appears after the irritation which is considered as its cause; 2nd, it is not accompanied by any evident alteration of the nerve or of the tubercula quadrigemina; 3rd, it increases or diminishes in perfect correspondence with an increase or a diminution of its supposed cause; 4th, it is generally quickly cured or ameliorated when the supposed cause is removed."

I may also just suggest that cases of this kind might, if carefully examined, throw some light on the question, whether the eye or the brain perceives colour. I believe that the eye itself completes the act of seeing, not only in reference to form, size, and distance, but also as to colour, and that the brain

merely perceives what is sent to it from the eye. My object in introducing the remarks on reflex amaurosis was to show that the disease produced is a local one of the retina, and not of the brain, or at least not of that part of it which has to do with the reception of the *idea* of size, form, colour, &c., from the retina; so that the coloured vision was a consequence of local disease in the eye. The brain erred, not primarily, but in *receiving* false intelligence from the retina.

As to the subject of reflex amaurosis, by itself, I hope to be able to bring forward better evidence in a future paper; and by the kindness of Dr. Brown-Sequard and Mr. Poland, I shall be able to collect this evidence from several points of view, and thus to be able to separate more clearly this form of amaurosis from another group depending on intracranial disease affecting the course and origin of the optic nerves. I also hope, which is also of great importance, to explain those transient and slighter affections of the sight so common in cases of vertigo, the various kinds of headache, epilepsy, and simple debility. And conversely to throw some light on these diseases themselves by studying the circulation of the retina and iris,—the very furthest out-post of the cerebral circulation,—and thus to render more complete the natural history of those diseases.

The following extract from a letter from my friend Dr. Haydon, of Bovey Tracey, is of great interest in relation to the subject of coloured vision: I give it in his own words:

"I was called yesterday to see an old lady with a somewhat strange condition of her visual apparatus; about a fortnight since 'she suddenly discovered that her right eye was all but dark, and that she could only see things with her left eye, and that all she did see appeared of a blood-red colour.' I give her own words. There is no cataract, or other appreciable defect in her right eye, nor can any external examination detect disease in the left; she has had no seizure or appreciable disease of the brain, but she is very stout, near seventy years old, heavy and sleepy; some two years since had some functional derangement of liver, followed by general dropsy. Free purging and a little calomel removed this; and there has been no return of it. Living careless, diet poor, no stimulants; the pupils dilate and contract readily and freely. I once before had a case very similar to this as regards the seeing everything of a red colour, but that person (also an old woman) had become so diseased in sight after an attack of apoplexy."

Dr. Haydon subsequently informed me that this patient recovered her sight. There was no ophthalmoscopic examination, and it is therefore possible that there may have been some other more organic disease than mere impairment of the nutrition of the retina. If, however, it was, which is my opinion, a case of reflex amaurosis, I have now given a case of red, yellow, and blue

vision, or, as I have said before, a case in which (white light entering the eye,) the retina did not perceive the yellow and the blue rays, another in which it did not perceive the red and the blue, and a third in which it did not perceive the red and the yellow. I might have given others in which, as I think, the change has gone a step further, and in which the patient, to use for convenience a contradictory expression, saw blackness, or rather did not see at all. In the congenital colour blindness there is an inability to see the colour of an object, and generally the red, the most refrangible, is the one which is not seen. As I say, in the above cases, the colours were various, but I can conceive that it is possible, that in the progress to blindness, there is, although unobserved by the patient, one order of progress, but in what order, and whether beginning from one end of the spectrum or not, I do not pretend to know.

CASES WHICH REFER TO THE OPHTHALMOSCOPIC DRAWINGS OF GROUP V,

(See the Ophthalmic Hospital Reports, Vol. VIII. No. 1, Page 177,)

WITH REMARKS ON INTRA-OCULAR HEMORRHAGE.

By C. Bader, *Curator.*

Group V.—Plate I. fig. 1 and 2.

Case:—C. D., age 36, needlewoman and general servant, under the care of Mr. Hulke, a stout healthy person, has had six children, three of whom died, one of her relations died of apoplexy. Her urine appears normal; eight weeks ago (November 14, 1858), she accidentally discovered that the sight of the left eye was almost gone, she could only perceive the shadow of objects, and the light from the window appeared as if viewed through a dense red fog, there was no pain. The sight of the right eye was normal.

Jan. 14th, 1859.—Both eyes appeared healthy externally, except that the left pupil is more widely dilated, and acts sluggishly. Vision, left eye, the patient counts fingers with difficulty when held in front of, but not too close to the eye; she counts fingers readily when held opposite the more lateral parts of the retina. Right eye, vision normal.

May, 1859.—Vision, left eye. The patient reads medium type with difficulty; small portions of the retina, above and below the region of the yellow spot appear still impaired, since a small object (distance of fixed point one foot) when raised one inch above or half an inch below the axis of vision, is lost sight of, but is perceived by the more peripheral parts of the retina.

P.S.—Jan. 14th, 1858.—The right eye appears healthy. Left eye; the media are transparent, the optic nerve, as in the right eye, is grey-pink.

The region of the yellow spot is obscured by a large clot of blood (see Plate I. fig. 1.), which appears to be suspended in the vitreous space in front of the retina; its lower margin is sharply defined, a greyish opaque haze runs along its sides and shades off into the red fundus; a similar haze obscures the centre of the clot, a retinal vessel runs near its upper, another near its lower margin (inverted image); the latter is very thin while passing the clot, it appears as if sprinkled with brown pigment débris, and is unequally dilated on either side. I believe it to have been the source of hemorrhage.

May, 1859.—O.S. Left eye; the central portion of the clot has become absorbed, and the healthy fundus is in view. A circular well-defined portion of the clot remains above, and another below, see Plate I. fig. 2. The retinal vessel beneath the lower margin of the clot is still more contracted; the unequal dilation on either side remained the same, a small grey opaque fold of displaced retina is seen along the contracted portion of the vessel.

GROUP V. PLATE II. Fig. 1 and 2; and PLATE III. Fig. 1 and 2.

Case:—J. H., age 27, (under the care of Mr. Hulke), had been in good health until two years ago, when he felt a pain coming on gradually at a spot between the spleen and the stomach; this increased so as to keep him from work; the bowels began to be confined; he kept them open with Pil. Rhei. co.; confinement of the bowels for two days or so, was followed by severe pain in the head, with sickness. This state continued for five months, when the patient observed a small pulsating tumour, an inch above, and a little to the left, of the umbilicus. During the last four months he was much troubled with sleeplessness; he never slept for more than two or three hours at a time; he cannot lie on his back, as the tumour "does not appear to lie right." He can lie only for a short time on his left, and only with any comfort to himself on his right side. He feels most comfortable when slowly walking about and in cold weather. The appetite has been failing since the commencement of the pain; the latter is increased by irregularities of diet. The patient has lost in weight three stones within the last two years. He suffers from violent palpitations of the heart, when anything surprises him, but not at other times. The patient's father died at the age of 49, "from a bad leg which had suddenly healed up;" his mother died at the age of 29, after a confinement.

Present state:—The patient looks yellowish and thin; his movements are slow on account of the pain in the abdomen; the heart is slightly hypertrophied, the lungs and kidneys appear normal. A well-defined, fixed, hard, roundish, and pulsating tumour (synchronous with the systole), of the size of a small fist, is felt above and a little to the left of the umbilicus; it is very painful to the touch. A small aneurisme is found on each femoral artery, just beneath Poupart's ligament. A fortnight ago the patient observed an impairment of his sight; he felt a slight pain at the back of both eyes, which soon subsided; having previously had very perfect sight; he wishes to have his eyes examined. Both eyes appear healthy, except that both pupils (individually and in concert) act sluggishly.

The patient tells the time on a distant clock readily, and reads large but not small type fluently.

O.S.—July, 1858.—Both eyes: the media are transparent; the morbid appearance of the fundus is nearly the same in either eye, and is confined to the regions of the yellow spot and of the optic nerve. The contour of the optic nerve is not perceptible; the red fundus in the region of the optic nerve has an obscurely striated appearance (see Plate III, Fig. 2); the brilliant

whitish opaque striæ radiate from that region; the retinal vessels emerge from its centre; they are few in number, unequally dilated, tortuous, and interrupted at intervals; they have been ruptured at many places, thus sprinkling the retina with numerous streams and spots of bright red blood; the bloodstreams, being interposed between and beneath the radiating striæ, run parallel with the latter.

The region of the yellow spot in either eye is occupied by a large, irregular, yellowish-white opaque brilliant patch (see Plate III, Fig. 1), which gradually shades off into the red fundus; its centre is finely dotted with brown pigment, which, towards its periphery, is arranged in delicate radiating brown striæ; several retinal bloodvessels pass near and one over this patch; the latter vessel, while upon the patch, is very thin.

The fundus around these morbid portions has a diffused red colour, which, before reaching the equator of the eye, gives way to a healthy choroid and a transparent retina.

Pathology; supposititious: The contour of the optic nerve (*i.e.*, the margin of the sclero-choroidal aperture,) is obscured by the effusion of serum and blood in and upon the retina (retinal aperture). The brilliant whitish opaque radiating striæ, in the region of the optic nerve, are the bundles of optic nerve-fibres, rendered visible by the effusions upon the retina; they are no more seen where the relative position of the choroidal and retinal elements are undisturbed.

The peculiar state of the region of the yellow spot may be due to an effusion, probably of blood, which has occurred between sclera and choroid, whereby the latter has been displaced inwards. This displacement may have impeded the passage of blood through the optic nerve, and may have given rise to retinal hemorrhage; there may also have existed an aneurismatic state of the blood-vessels of the eye; but it appears more probable that some of the contents of the aneurismata were thrown into the retinal and choroidal circulation, giving rise to rupture of blood-vessels, &c.

The patient, after a few days, left the hospital at his own request, and I hear that he died suddenly the same day, on leaving the railway-carriage. A request for an examination of the body or of the eyes was not responded to.

Group V.—Plate IV, Fig. 1.

Case.—Wm. B., age 39, under the care of Mr. Bowman, November 20, 1858; is a sallow-looking, thin, rather nervous man. He was strong and in good health until five months ago. He then began to suffer from what is called diabetes insipidus (spec. grav. of urine, 1017), and was troubled with palpitations of the heart. His heart appears enlarged; his pulse is intermittent; he has lost much weight lately. His father suffers from some paralytic affection of the lower extremities. Three months ago while writing, he suddenly found that he could not read with the right eye; the lines appeared wavy, and he had a pricking sensation in the eye; he can at present only distinguish a printed from a blank page, and this better opposite the lateral parts of the retina. The exterior of this right eye appears healthy, except that the pupil is semi-dilated, and only acts in concert with the fellow pupil.

O.S.—November 20, 1858.—Right eye. The vitreous space is turbid; the optic nerve (almost as red as the fundus) is faintly seen. The fundus, especially round the yellow spot and optic nerve, is sprinkled with numerous roundish small blood spots, and others of a buff colour. Three enlarged retinal blood vessels can be traced to some distance from the optic nerve into the hazy fundus.

O.S.—February 20, 1859.—Right eye; most of the small and some of the large red and buff-coloured spots have disappeared; red spots with buff mar-

gins, and buff spots with red margins forming the transitions before the disappearance of the spots.

O.S.—February 28, 1859. (See Plate IV, fig. 1.) Right eye: The media are almost transparent; the optic nerve is slightly cupped, whitish in the middle and the remainder grey pink; a small blood spot is seen in the white portion of the nerve; the veins, while in the retina are tinged and numerous; the arteries have the double contour. The veins and arteries while in the optic nerve carry little blood. The pressure on the retinal veins, while passing the zone which surrounds the optic nerve accounts for their turgidity. The fundus is sprinkled with few large and some small blood spots and with a few buff-coloured patches; a greyish white opaque zone surrounds the optic nerve, where it passes through the choroidal aperture; at some distance from this is a buff-coloured patch sprinkled with small brown spots. The blood clot on the nerve and a large clot overlying several of the large retinal blood vessels have appeared very recently. Vision is slightly improving; the patient readily tells a printed from a blank page, but soon loses sight of objects when fixing them for some time. The left eye is healthy.

March 25, 1859.—Vision of the right eye has suddenly been reduced to faint perception of objects during an attack of severe pain in the eye; the latter is hard, the conjunctiva and ciliary region congested, the aqueous turbid, the pupil irregular; the optic nerve is faintly seen. Iridectomy was performed; it was followed by a temporary relief of pain.

April 13, 1859.—New attack of pain; increase of tension; bulging of cicatrix in the cornea: turbid aqueous; posterior synechiæ. Iridectomy, followed by spontaneous bleeding from several parts of the iris. Slight relief of pain.

May 23, 1859.—Extreme pain and tension; faint perception of light. Excision of the right eye. The eye was given to Mr. Hulke for examination. I had the pleasure of assisting at the dissection two hours after the operation, and made the following notes at the time:—The eye is still hard; the optic nerve appears slightly cupped; the margin of the cup is not abrupt; most of the retinal vessels pass out through the middle of the cup, and are not pressed on its margin, which is probably due to these changes being comparatively recent, and to the eye having been opened; the blood vessels appear to be kept in situ by the connective tissue of the optic nerve and of the surrounding retina. A brownish (old) clot of blood and some transparent yellowish fluid are seen in the middle of the cup; the vessels appear much thinner while in the cup. The vitreous had a saturated yellow tinge; some portions (nearest the retina) were viscid (had lost their consistence). The fundus, especially round the optic nerve, is sprinkled with (*a*) numerous small and large blood spots; with (*b*) chalky-looking well defined yellowish white opaque patches (O.S. buff-coloured patches), and with (*c*) a few grey white opaque patches, powdered over with brown pigment; *a* and *b* are seated in the retina, and come away on detaching that membrane from the choroid; *c* are seated in and upon the choroid.

a. The large and small blood-spots are formed by free blood, which lies beneath the optic nerve fibres in the superficial layers of the retina, it has escaped from the large and small retinal vessels; the retinal vessels in the neighbourhood of the red and buff spots are varicose, many are aneurismatic, no other morbid change is traceable in the walls of the capillaries and none in those of the large retinal vessels. *b*. The chalky-looking, well-defined, yellowish-white opaque patches (O.S. buff coloured spots), are on a level with the blood-spots; each patch consists of an accumulation of large granule corpuscles, of fat globules and of aneurismatic capillaries; the contents of the aneurismata have undergone some change (fatty?) and present the same, yellowish, chalky-looking appearance as the granule corpuscles. *c*. The few grey white opaque patches, also the zone round the optic nerve, are due to small (albuminous?) effusions upon the choroid, some of which are powdered

over with choroidal epithelium. The retina and choroid appeared healthy, except where they were disturbed by the above effusions, many of the hexagonal cells were rounded off.

Group V.—Plate V. fig. 1 and 2.

Case:—C. D., age 37, (house painter, under the care of Mr. Critchett), is a thin, spare man of hazel complexion and of temperate habits, with a family of healthy children. Thirty years ago he received a blow on the left eye, which was followed by "cataract," but the eye had perception of light for the following 16 years; it decreased gradually, and the eye has been blind for the last 14 years. Thirteen months ago it became spontaneously painful and inflamed; the inflammation subsided during an antiphlogistic (leeches, blisters, &c.) treatment of nine months. Shortly after the eye had become quiet an attack of pneumonia with dropsy followed. A small quantity of albumen was found in the urine. Then came a new attack of inflammation in the left eye, with a mistiness and slight pain in the right eye, while the patient was recovering from the pneumonia. The left eye was excised; I had not the opportunity of examining the eye. A week before removal of the left, vision of the right eye became misty; six weeks later pain was felt over the right side of the head, at the same time a greyish-white dense fog was noticed, towards the right side of the eye, which, after a few days, became changed into a yellowish-brown cloud, and this, three days later, spread out into a general yellowish mist; through it the patient could see (not read) large letters; large objects appeared distorted, crooked, &c., and were lost sight of beyond the distance of 10 yards. Vision became gradually worse; objects appeared no more crooked, but as if seen through a thick, white fog, which in some places seemed more transparent. I then (July 9, 1857) examined the patient for the first time; the tension shape and movements of the eye are normal; the pupil is enlarged and acts sluggishly.

O.S. (see Plate V. fig. 1)—The media are transparent; the optic nerve appears large, yellowish-grey, and anæmic; it is sprinkled with minute blood spots. The bundles of optic nerve-fibres radiate from the optic nerve over the retina, and appear as yellowish translucent striæ, which reflect the light strongly; this gives the fundus a yellowish and red striated appearance, which is sometimes observed when an effusion has occurred upon the retina, *i.e.*, beneath the bundles of optic nerve-fibres; the striated appearance is readily explained by the manner in which the nerve-fibres are tied down to the retina. The striæ cease at or near the equator of the eye, and the fundus assumes its healthy appearance. The effusions beneath the optic nerve-fibres, at the retinal aperture, render the latter ill-defined, particularly its outer and lower portion. The fundus round the optic nerve and in the region of the yellow spot, is thickly strewed with bright red and brownish red ecchymoses, and with buff-coloured and bluish-white and opaque well-defined spots; these latter are roundish or oval, and of considerable size—some as large as a large pin's head, some are single, others in groups; the greater number are skirted by ecchymoses. The retinal blood-vessels are numerous; some are extremely tortuous and unequally dilated; others have double contours; many are very thin in their course through the optic nerve, but gorged with blood while in the retina; most of them appear interrupted where they pass across the retinal aperture. The descending vessels (inverted image) are distinctly pushed forwards at that spot, which appeared to me to be caused by a slight detachment of the retinal aperture from the choroid. Some of the retinal vessels cannot be traced beyond the blood spots; others are enlarged on the side of the blood spot furthest from the optic nerve and *vice versa*; some

blood spots retain the shape of blood-vessels (it appeared as if a portion of both sides of the vessel had given way simultaneously). Several of the ecchymoses have perforated the optic-nerve fibres, and are suspended in the vitreous space; they possess a slight movement. The retinal vessels at and beyond the equator are gorged with blood.

April 9, 1859.—Vision is reduced to perception of shadows, which is best opposite the outer and upper part of the retina. There has been no pain, no flashes of light. The patient, when moving the eye, perceives a white floating cloud; the eye has a tendency to wander out and upwards; there is slight chronic ophthalmia; the pupil is dilated and acts very sluggishly.

O.S.—Numerous grey opaque large and small shreds and membranes float about in the vitreous space, and sink towards its deepest part, when the eye is at rest; few dark-brown opaque clots of blood are suspended near the larger ecchymoses; they have a limited movement in front of the retina. For the alteration of the optic nerve and of the surrounding fundus, see Plate V, fig. 2. The optic nerve is faintly seen; it appears smaller, bluish-white, opaque, and anæmic; it is ill-defined; few thin blood-vessels pass through it; they can only for a short distance be traced into the retina; one of these was ruptured while pressing slightly on the eye during the ophthalmoscopic examination. A bluish-white, silvery opaque fold of displaced retina, with a blood-vessel along the ridge of the fold, extends from the side of the optic nerve downwards as far as the equator of the eye; it floats laterally when the eye moves. The fundus above and on the right side of the fold of displaced retina, has a uniform turbid red appearance. (I believe the retina of this part to have become translucent and slightly displaced from the choroid, by transparent fluid.) On the left of the fold it is in opposition with the choroid, and sprinkled with fresh and old diffused blood spots, and with ill-defined buff-coloured patches; several of these, but smaller and well-defined, are seen in the more healthy-looking equatorial portions of the retina.

Aug. 12, 1861.—The general health of the patient (who is ill fed, &c.) has been unimpaired; the urine is healthy. The eye wanders out and upwards; the tension is normal; the anterior chamber is small; the aqueous and iris have a yellowish-green hue; the pupil, of medium size, contracts throughout after the fundus has been exposed to light for a few seconds. Faint perception of light exists opposite the inner and upper part of the retina; the patient does not continue to see the yellow cloud.

O.S.—A faint grey-red reflection is obtained from the outer and lower portion, and a turbid-grey reflection from the remainder of the fundus; no optic nerve; blood-vessels, &c. are perceptible.

Group V.—Plate VII., fig. 1, 2 and 3.

Case:—M. S., age 25, (Schoolmistress, under the care of Mr. Poland), a healthy-looking person, with a peculiar strain about the face, with chronic enlargement of the tonsils and with healthy but irregularly arranged teeth. She states that her mother and relations are in good health, but that her father suffers from varicose veins, and ulcers in the leg. Four years ago she had an attack of sore throat and cough; her urine was thick at that time. This had entirely subsided when both eyes began to fail; she was then staying in the country, when one morning while in church, she suddenly observed that on closing the right eye she could not see the print in the prayer-book, and only perceive the shadow of persons when close to her. Vision of the right eye was also impaired, but she could read ordinary type with it. This state continued for a few days, when she applied at the hospital. She could then see but not read large type with the right eye, and only medium type slowly with the left, the letters appeared confused when using both eyes, and

she could only read one word at a time distinctly; she did not recognize large distant objects with either eye. The pupils acted sluggishly, there was no pain.

O.S.—Jan. 1857.—The media and the retina were transparent, the optic nerves highly congested, the regions of the optic nerve and of the yellow spot appeared diffused red, and were thinly sprinkled with flat, well-defined blood-spots, which compared with the diffused red fundus, had a darkish red colour. The turgid retinal blood-vessels pass uninterrupted over these spots; the latter are supposed to be in and upon the choroid. The patient was under observation for two months, then discontinued attending.

May 13th, 1859.—Both pupils are of medium size, and act sluggishly; there was never any pain. Vision, right eye; reads large type at a range from 5 to 8 inches; left eye, reads smallest type at a range from 5 to 9 inches. The patient recognizes a person with difficulty across a street and only with the left eye, when looking at a fire the glare of the fire appears in many places sprinkled with black patches (interrupted); the patches are less numerous opposite the more lateral parts of the retina, the peripheral parts of the retina appear healthy.

O.S.—May 13th, 1859.—Both eyes; the media are transparent, the fundus is brilliantly lighted up; the optic nerves are healthy, the region of the yellow spot has a delicate red appearance, through which some large (choroidal) blood-vessels are perceptible. The pale red fundus round the optic nerve and yellow spot is strewed with brilliant, well-defined white, black and light brown, and with diffused bright red patches. Most of the black patches are on a deep red, some on a white ground. Large tortuous choroidal vessels ramify among the white, and beneath some of the red patches. The retinal blood-vessels, where they pass over black patches are in some places obscured, in others much narrowed, they appear otherwise healthy.

GROUP V. PLATE VIII. Fig. 1, 2, 3 and 4; and PLATE VIII[a]. Fig. 1 and 2.

Case:—Maria Duck, æt. 22, (under the care of Mr. Bowman,) presented herself, April the 18th, 1857, with impairment of sight, chiefly of the right eye. The patient, of dark complexion, is thin, weak, and delicate looking; the catamenia did not appear before the age of twenty, and only regularly during the last twelve months. Three years ago she observed accidentally that she could not distinguish objects, when placed in front of the right eye, and that only on looking upwards she could count fingers with this eye; the loss of sight appeared to her to advance from below upwards; the eye had, after another year, lost all perception of light; it was never troubled with luminous spectra or with pain; it used to water occasionally. Within the last three weeks the sight of the left eye begins to be misty; objects appear as if seen through a fog, especially opposite the lower part of the retina. The patient tells the time on a distant clock, and reads small type fluently, but the eye soon feels tired.

Two years ago the hair of the left eye-brow and of the left temporal portion of the scalp began to fall out; there are at present only a few hairs left near the inner canthus.

The eyes are small and globular; their movements are parallel, but the right eye wanders outwards on fixing; the right pupil is of medium size, and only acts (sluggishly) in concert with the left one.

O.S.—April 18, 1857.—Right eye: The optic nerve can be seen dimly when the patient looks down; it is ill defined, and of a dirty pink colour; a few thin blood-vessels pass through it, which, with difficulty, can be traced into the retina; the surrounding fundus appears brownish turbid red, and with the slightest movement of the eye becomes obscured by grey-white

opaque, freely floating, films and shreds. Plate VIII, Fig. 2, 3, and 4, represents the peculiar appearance of other portions of the interior of the eye: fig. 2, a view of the temporal portion; fig. 3, a view of the central portion of the interior of the eye; fig. 4, a view of the nasal portion.

In none of these views was a red reflection obtained from the fundus.

The interior of the eye, in Plate VIII, Fig. 2, appears of a dark violet colour; in Plate VIII, Fig. 3, of a darker tint of the same colour; and in Plate VIII, Fig. 4, a fold of greyish-white opaque and displaced retina, with a retinal blood-vessel branching over it, is seen at the side of the peculiar dark reflection; the fold has a limited undulating movement. I attributed this appearance of the eye to bleeding into the vitreous space of long standing, with a partial displacement of the retina. The dark reflection reached as high as the upper-third of the lens.

Left eye: The media are transparent, the optic nerve appears healthy; the fundus has a peculiar misty, brownish-red appearance: the retinal vessels are unusually thin and few in number.

October, 1858.—Right eye. O.S. No view of the fundus can be obtained, the vitreous space being filled with grey and brownish-grey opaque shreds and membranes; they float about freely; the larger ones gravitate, but without quite sinking to the deepest part of the vitreous space.

August 25, 1861. The patient has been taking iodide of iron, chinin, and Ol. Morrh. alternatively for the last three years. Her general health, though weakly, has remained unimpaired; the hair of the left eye-brow, and on the corresponding temporal side of the head, has not grown again. The left eye feels weak whenever the catamenia are disturbed, the right has remained blind; it was never painful nor troubled with luminous spectra (flashes, stars, &c.); it is slightly everted, and only follows the movement of the good eye reluctantly. The right pupil is of medium size and fixed; it acts sluggishly in concert with the fellow pupil.

O.S.—Left eye: The fundus has lost the misty appearance; the retinal vessels are more numerous and larger.

Right eye: The media, except a few grey-opaque striæ, close behind the lens, are transparent; the striæ appear to be changed portion of vitreous, which, in an irregular manner, are stretched out behind the hyaloid fossa.

A drawing of the optic nerve and surrounding fundus (Plate VIIIa, fig. 1), and of the portion of the fundus from whence I believe the bleeding in the vitreous to have originated (Plate VIIIa, fig. 2), have been added to the collection since the publication of the list of ophthalmoscopic drawing (Ophthalmic Hospital Report, Vol. VIII, No. 1, page 175). The optic nerve is pale pink and very ill-defined on account of the morbid state of the choro-retinal aperture, which is pinkish-yellow and opaque and shades off, into a whitish opaque zone; the latter gradually disappears in the equally turbid red fundus; the retina and choroid at and beyond the equator assume a healthy appearance, the equally turbid red appearance and other morbid changes are confined to the regions of the optic nerve and yellow spot. About three lines from the inner and lower margin of the optic nerve is seen (*a*) a pale greenish-white opaque and well-defined spot (of the size of a large pin's head surmounted by (*b*) a black well-defined oval zone of pigment (see Plate VIIIa, fig. 2). Part of this zone is skirted by (*c*) a well-defined white opaque patch, part by (*d*) a pale pinkish-blue one, and part by the turbid red fundus, into which *a* and *b* shade off gradually. A bluish-grey opaque narrow line (*e*) of about two lines in length, runs across the fundus near the lower margin of the optic nerve; one would have said a cicatrix in the choroid, if it had been observed after an external injury to the eye; few thin retinal blood-vessels ramify over this part of the fundus, one of which is lost sight of in the black zone. I believe this to be the explanation of the morbid changes in this eye; the choroidal blood-vessels had been ruptured at *a* and *e*; the blood had displaced one and perforated another portion of the retina, entered

the vitreous space and advanced as far as the hyaloid fossa, when it produced the appearances shown in Plate VIII, fig. 2, 3 and 4.

Absorption of the blood had taken place; the vitreous space became occupied by transparent fluid, the retina resumed its apposition with the choroid. *a*, *c*, *d* and *e* are more or less atrophied portions of choroid; *b* is an accumulation of the so-called choroidal epithelium. The impaired transparency of the retina and the morbid changes of the choroid round the above patches account for the turbid red state of the fundus. The morbid changes at the choro-retinal aperture may have led to destruction of the optic nerve fibres.

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Part I.

Original Contributions.

GONORRHŒAL INFLAMMATION OF THE EYEBALL, OR GONORRHŒAL IRITIS.

By J. C. Wordsworth,

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It is not a little singular that so severe a disease as "gonorrhœal iritis," or inflammation of the eyeball, dependent on the constitutional influence of gonorrhœa, is ignored by ophthalmologists of great acumen and vast experience; yet such is the fact. No doubt it may and does happen that, under perfectly similar circumstances, the experience of different observers may be very dissimilar as to the frequency of a given disease; for, independent of any *real* difference that may occur (and no one can question that that may be), there is, probably, a much more efficient reason for incongruities in medical statistics, arising from peculiar tendencies in men's minds to recognise or ignore particular views as to the etiology of disease. Hence comes

a difference of diagnosis which sadly mars the value of statistics through all the domains of medicine, and I imagine will do, so long as men fail to deduce like conclusions from like premises. But there is yet another source of fallacy, that cannot be excused on account of the subtilty of its nature: I allude to the inadvertence of the surgeon in not recognising the existence of gonorrhœa as a coincidence with iritis. Still, much may be said in extenuation of his inaccuracy on this subject, for it often results from the pertinacity of his patient, or at least from his reticence while under examination. Every practical surgeon knows that it is difficult, and often impossible, to gain the entire truth from patients in reference to their having had syphilis or gonorrhœa.

Again, syphilis always leaves its impress on the organism, and it therefore becomes a problem for the surgeon to solve how much depends on past or present disease when iritis is under consideration.

The frequency of this complication is so common, that it becomes, indeed, momentous in forming an exact diagnosis, and adds considerably to the surgeon's difficulties; so much so, that some surgeons think it is thus placed beyond *certainty*.

Lastly, I may mention an additional difficulty that besets this subject, viz., that it has been very differently pourtrayed by the standard authors.

Having, then, alluded to the reasons by which different observers may have come to such varied opinions as to the frequency of "gonorrhœal iritis, viz., an *actual* relative disproportion in the cases that occur to individual surgeons; a peculiar ratiocination on the part of the observer; the inaccuracy arising from imperfect investigation; and lastly, the great and inseparable difficulties by which such cases are surrounded, I shall now quote the writings of those whose dicta furnish our principal sources of information on this subject in England.

In his excellent and practical work on "Diseases of the

Eye," published in 1855, Mr. Dixon writes on this subject as follows:—

"Ophthalmic writers of credit and experience describe a 'gonorrhœal iritis,' but I have never seen an inflammation of the iris which I could trace as a consequence of mere urethral discharge, unmixed with syphilis."

This is the experience of one of the latest writers on ophthalmic medicine; of his experience and accuracy as an observer I need not speak, beyond remarking that the former is the result of nearly twenty years' practice at the most extensively attended ophthalmic hospital in the world.

Mr. Wharton Jones, referring to this subject in his classic work, "The Principles and Practice of Ophthalmic Medicine and Surgery," simply observes that "Rheumatic iritis, along with rheumatic inflammation of the joints, sometimes occurs as a consequence of gonorrhœa." With this exception, I find no further allusion to the subject, and therefore conclude that it has so seldom, if ever, come under his immediate observation, that he is content with this simple admission; for so accurate an observer and writer would otherwise not have failed to write at greater length on this important subject.

In his splendid book on the "Diseases of the Eye," Dr. Mackenzie has devoted a section to "gonorrhœal iritis." On this, as indeed on all subjects connected with ophthalmology, his remarks are so valuable that I need offer no apology for transcribing them at some length. Having alluded to the doubts entertained by medical men as to the real etiology of this disease, he proceeds as follows:—

"The iritis which owes its origin to gonorrhœa may or may not be preceded by synovitis. In general the inflammation of the eye is very severe; it often commences with redness of the conjunctiva and sclerotica, and a striking haziness of the lining membrane of the cornea; the inflammation speedily affects the anterior surface of the iris, which loses its natural colour. The disease for some days appears to be an aqueo-capsulitis. It then merges into an iritis

serosa; the pupil becomes contracted, and the vision dim. A profuse effusion of coagulable lymph now takes place, speedily filling the pupil, and sometimes falling down in a curd-like form, and in considerable masses, into the anterior chamber. In some cases the anterior surface of the iris is covered with lymph, as if coated with white paint. The anterior chamber is sometimes almost filled with the effused lymph; in fact, no other variety of iritis presents this symptom in the same degree. There is, in general, violent pain in and round the eye, with epiphora and intolerance of light. I have seen considerable chemosis, or conjunctival œdema, attend gonorrhœal iritis; but there is no purulent discharge from the conjunctiva. There are no tubercles or abscesses on the surface of the iris, as in syphilitic iritis. The pupil, if the case is left to itself, remains contracted, and adherent to an opaque capsule, with the retina much more sensible, the iris less changed in structure, and the eyeball altogether less thoroughly disorganized than in syphilitic iritis, but with a great disposition left for relapse. . . . . Generally, one eye only is affected, sometimes the same eye suffers repeatedly. In other instances, first the one eye is attacked, and next time the other is inflamed. Rarely are both eyes affected at once.

The patient is generally troubled with gleet when the iritis occurs. In some cases the iritis alternates with synovitis and gonorrhœa, so that when one of them is present the others are gone. It rarely happens that all three are present at once.

Prognosis.—The gonorrhœal is generally more rapid in its progress than any of the other varieties of iritis, and is one of the most severe and formidable while it lasts, but yields more promptly to decided treatment than any of the rest, and affords examples of perfect recovery, even when the aqueous chambers are filled with lymph. In no other variety is the recovery so striking and complete. . . . . The patient often suffers several severe attacks, and yet vision is preserved entire. It is only from very numerous relapses, and when

the treatment has been originally mismanaged, that the pupil is left irregular and contracted, and vision permanently deteriorated. . . . . Although the disposition, then, to an effusion of lymph is greater than in any other iritis, the tendency to organization of the effused lymph is less than in the other varieties.

Treatment.—Repeated and copious venesection; leeches round the eye; calomel, with opium, in frequent doses, so as rapidly to affect the system; and the application of belladonna; make up the treatment.

I shall afterwards offer a few comments on this account of the disease, and contrast it with that given by another eminent ophthalmic writer, to qualify my statement that some difficulty has been added to this subject by the dissimilar portraits of different observers.

Mr. Lawrence, in his great and invaluable work on "Diseases of the Eye," gives a lucid account of this affection, under the heading of "Gonorrhœal Inflammation of the External Tunics and Iris." His account of the disease so exactly coincides with all that I have observed, that I shall quote it *in extenso*:—

"The vascular trunks lying between the conjunctiva and sclerotica are distended, and the anterior portion of the latter membrane becomes pink or purplish red. As the conjunctiva participates but slightly in the affection, these changes are distinctly seen through it. There is increased lachrymal secretion, severe pain in the eye, with sense of tension, intolerance of light, with discharge of tears on the slightest exposure. The pain and intolerance are sometimes excessive, so that the smallest access of light cannot be borne.

"The inflammation soon extends to the iris, which loses its brilliancy, assuming a dull and deeper hue. The pupil contracts, and lymph is effused from its margin. The external redness is increased, the vessels of the conjunctiva being more distended. The cornea, at the same time becomes hazy, and vision is more or less impaired. Nebu-

lous opacity and speck of the cornea are sometimes produced. As the inflammation subsides, the iris recovers its natural colour, and vision is restored.

"If the inflammation be considerable, it may cause adhesion of the pupil, with contraction of the aperture; and the adhesions thus formed are sometimes white, as in arthritic iritis. Even permanent dimness of sight may be produced. Sometimes repeated attacks of the disease occur, each of which causes fresh adhesion, so that at last the pupils are fixed in their whole circumference, and considerably contracted."

Dr. Jacob, in his admirable "Treatise on Inflammation of the Eyeball," has devoted a chapter to the consideration of "Inflammation of the Eyeball from Gonorrhœa." He states—"It is evidently not a common form of disease, and if the truth was known, perhaps it might be said that it is a rare disease. At least I have found it so. . . . . The information extant respecting it is not the most perfect or satisfactory, and doubts may be entertained respecting some of the views promulgated as to its origin, nature, and symptoms."

He considers it primarily more a disease of the cornea than of the iris, though he admits that the iris is secondarily soon affected. His account of it coincides more with that of Dr. Mackenzie than with Mr. Lawrence's, though in some respects he differs from both these high authorities in the detail of this disease.

The late Mr. Tyrrell wrote to the following effect in his book on the "Diseases of the Eye":—"Some of the most obstinate forms of this disease (inflammation of the conjunctiva and sclerotic) which I have witnessed, have been connected with the constitutional taint which has originated in gonorrhœa."

He records several cases in illustration, in which the iris was decidedly inflamed, producing posterior synechia, and other unequivocal signs of iritis. But it is somewhat remarkable that he does not allude to gonorrhœa, either as a cause

or as a coincidence in treating of iritis and sclero-iritis. His account of the disease corresponds generally with that given by Mr. Lawrence. He considered the disease principally one of the sclerotic and iris, and only indirectly, if at all, involving the cornea.

In the year just lapsed it occurred to me to have to treat three cases of iritis in association with gonorrhœa. I had previously been a close observer of the practice of the Royal London Ophthalmic Hospital for ten or twelve years, as well as that of one of the largest general hospitals in London, and had failed to recognise a case of iritis which appeared dependent on gonorrhœal influence only. I had frequently seen it in association with gonorrhœa and syphilis together. I had taken some pains to satisfy myself as to the existence of gonorrhœa, by careful examination of the genitals of patients that were the subjects of iritis. But all my cases proved either negative as to gonorrhœa, or complicated by syphilis. As I saw some hundreds of such cases in that period, I was, of course, convinced that the true gonorrhœal iritis was comparatively very rare; for the two hospitals afforded me not only great opportunities, but also a great variety of secondary gonorrhœal and syphilitic cases.

My experience thus is limited to three pure cases; though, in common with those whose writings I have quoted so largely in this paper, I have failed to observe any pathognomonic characters in these cases, I think I have noticed some circumstances about them that are not commonly associated with other forms of iritis in the same degree.

In the first place, the subjective symptoms were severe out of all proportion to the objective; the pain was most severe, and resisted all treatment for a time. They were all attended by profuse lachrymation, and intolerance of light, beyond what I had ever noticed in syphilitic or rheumatic cases. They peculiarly resented all attempts to dilate the pupil, which soon became contracted and fixed. And all required mercury for their cure, though unattended by much exudation or great vascularity of the iris itself; but synechia posterior occurred in all.

The first case was that of an elderly gentleman, who was suffering from a profuse urethral discharge, synovitis of both knees, with great effusion into the joints, and double iritis. He had had two or three previous attacks. When I was called to see him, he had considerable sclerotic vascularity, forming a complete corneal zone of rather livid hue; the corneæ were partially opaque, and permitted but an imperfect view of the irides; the pupils were contracted and irregular. He had intense pain round the orbits, and deep in the globes, profuse lachrymation, and his vision was diminished, and attended with great discomfort. He was greatly depressed in health and spirits, his tongue was very foul, his stomach irritable, his skin covered with clammy cold perspiration, and his circulation very weak and irregular. Belladonna was applied locally, after a few leeches had been applied to the cheeks; light tonics and sedatives were administered internally. In consequence of the irritability of his stomach, we were obliged to change the remedies often, till he recovered sufficiently to commence a slight mercurial course. He suffered so much from the application of belladonna and atropine, that we were obliged to discontinue their use; indeed the eye and even the lids were so tender and irritable, that no application could be borne.

As soon as the mercurial influence was established, the disease began to abate, and he slowly and progressively improved. With slight changes in the weather the improvement was interrupted two or three times; but he ultimately made a tedious recovery. Some synechia resulted, as he could never bear the belladonna, but vision was restored to a satisfactory extent.

The next case was that of a young man, a patient at the Ophthalmic Hospital, who had contracted unmistakeable gonorrhœa, and after some weeks suffered severe inflammation of the joints, and on its subsidence was attacked by severe sclero-iritis of one eye. When he came under my care, synechia posterior had occurred, and vision was much impaired. His sufferings were most severe. The eye was so

intolerant of light, that he could scarcely endure an examination; but so far as I could see, there was no visible exudation into the chambers. The substance of the cornea was clouded. Under the influence of atropine, the pupil partially dilated, and several points of adhesion to the capsule of the lens became evident.

Leeches were applied to the cheek, and he was directed to use belladonna fomentation, if he could bear it. Mercury, in the form of calomel, with opium, was administered three times a day, and in the intervals iodide of potassium and iodine mixture. He made a rapid and complete recovery as soon as the mercurial treatment began to influence his constitution, though, as usual in giving this combination, he had none of the inconvenience of ptyalism nor were his gums even sore.

The last case was that of a middle-aged man, also a patient at the hospital, who had gonorrhœa, synovitis in both knees, and iritis in the left eye, and afterwards in the right. When admitted under my care, synechia had occurred in both eyes. The inflammation in the left had partially subsided, leaving his sight considerably impaired. He was suffering intense pain in and round the globe of the right, and the sight of that eye was much diminished.

An examination gave him so much distress, that he could not endure more than a momentary view. The eye and lids were so tender that he could scarcely bear them touched, and the admission of light produced great spasm of the orbicular muscle, and abundant lachrymation. The vascularity of the sclerotic was of purplish hue, and completely surrounded the cornea with a zone. The cornea was somewhat dull and opaque, but allowed the iris to be seen; its colour and gloss appeared altered, but, in addition, I observed some interstitial exudation at its upper and outer part, in which red vessels could be seen.

Leeches were applied, and he took calomel and opium with the iodine mixture, as the last patient, and as soon as he could bear the belladonna, the pupil was dilated by its

influence. His recovery was rapid, and he was enabled to see as well as before, the pupil being round and free. He then ceased to take these remedies, and had quinine instead, and returned to his employment. In about ten days or a fortnight he reappeared at the hospital, when I was much mortified to find that the pupil had become again irregular from several points of adhesion to the lens, otherwise his recovery was complete.

In making a few comments on the cases thus recorded, I shall not lose sight of the very limited grounds that they afford for any generalization, and shall not venture, therefore, to dogmatise on them.

I may observe that they are necessarily stated only in outline, for had I been desirous of recording them with circumstantial detail, I must have relied on memory, having no notes of them. I venture to hope that the account is sufficiently full and accurate for my purpose.

I believe, then, that they were genuine examples of the disease; at any rate, they were as free from the sources of fallacy as these cases can be. I have stated above that they were typical of the disease as sketched by Mr. Lawrence, and were as unlike Dr. Mackenzie's picture.

In all, the cornea was decidedly involved, but the affection of the iris was the prominent feature of each case. they were all characterized by the absence of exudation into the anterior chamber, but synechia occurred in all. They fully illustrated the severe nature of the disease, its tendency to relapse and to recur, and its amenance to treatment.

ON THE USE OF ATROPINE-PAPER.

By Mr. Streatfeild.

At the present time, when atropine is so much used for ophthalmoscopic purposes, as well as for the treatment of iritic and other cases, I hope the mode of employing it, which I beg to introduce to the notice of oculists, for their

convenience, is very opportune. It is simply a coloured tissue paper imbued with a solution of the sulphate of atropine, of such strength that a small square piece of it, of a certain size, is equal to or contains as much of the salt as a drop or minim of the solution of a strength in ordinary use. The paper, soaked in the strong solution, is hung up to dry, and turned about while drying, that the atropine may be equally distributed. The little piece of the paper to be used, one-fifth of an inch square, is taken up on the tip of the forefinger, previously damped, and the patient's lower lid being drawn down, he is told to look upwards and the scrap of paper is put on the sclerotic conjunctiva below the cornea almost without the knowledge of the patient; the lid is then let go, and the piece of paper is left between the ocular and palpebral conjunctivæ; a handkerchief is then tied over the eye that the lids may be kept closed for awhile.

The atropine thus used, has, I find, acted at least as well as the drops of the solutions that are commonly employed, I think, as is likely, it has acted more powerfully than the drop of any equivalent solution, of which so small a quantity really remains under the eyelids when they are closed after its instillation. The tissue-paper becomes at once wet and soft with tears, lies flat on the eye-ball and creates no more conjunctival redness or lacrymation than the drop of solution.*

At first, when the present plan suggested itself to me, I used white paper, but this, soaked in tears, becomes transparent, and is hardly distinguished from the conjunctiva; since then I have adopted green paper, for red might not be plainly seen in any case of external redness of the eye, and strips of blue or yellow paper might be mistaken for litmus or turmeric paper. The green paper is always easily recognised: it contains neither copper nor arsenic. In a quarter of an hour, or whenever the mydriatic effect is produced, the scrap of paper is easily removed with the tip of the fore-

* In some cases, atropine drops may advantageously be warmed before they are used.

finger from under the lower lid, which is depressed for the purpose; if the little piece has got under the upper lid, it will be floated down by shutting and opening the eye a few times and may be wiped out, as before, without any difficulty.

The sole object I had in view, when this paper was first prepared for me was, as I have said, the convenience of those who, like myself, have constantly to be provided with atropine for use. I have carried about a small bottle of the solution in my pocket, and sometimes I had left it at home when I wanted it, but now I have always in my pocket-book some of the paper ready for use, almost without weight, occupying hardly any space, and making no separate item to be remembered. A glass bottle may be protected from breaking, or escape of the fluid, but all bottles are cumbersome, and the many different kinds of atropine drop-bottles, almost every oculist having his own pattern, prove that there was no very convenient method of carrying the agent, which in practice we most require; the paper will, I believe, be found not only convenient in this way but very efficacious. Its portability is perhaps the great advantage of the atropine paper, but, recollecting the small quantity of any solution dropped into the eye that is probably retained when the lids are closed, and its further dilution by the flow of tears generally produced, I think the atropine paper may be proved to be very powerful in those cases in which the *greatest* mydriatic effect is desirable; for the whole of the dose used is first placed within the lids, and lacrymation at all does not usually follow the use of the atropine paper, therefore I have been using it in cases of old synechiæ before operating for their detachment. The salt in the meshes of the paper is dissolved out gradually, and with very little, if any, increase of tears, is mixed with them to spread itself over the surface of the conjunctiva. Having thus explained the mode of its operation, I intend to try if the same paper vehicle will not be advantageous in the use of other drops and lotions for the eye. Perhaps a strip of paper,

soaked in a strong solution of sulphate of copper, cut of the size of the cartilage of the upper lid and laid upon its under surface when the conjunctiva is "granular," will not improbably act more efficiently than the drop of solution of the same salt, and less painfully than when it is applied in the solid form, the greater effect being attainable by the *real* use of as much of the salt as is contained in an ordinary drop of the solution used, and the pain being, I suppose, mitigated by a *gradual* application of the sulphate of copper instead of its being used at once in the solid form; but this remains to be proved.

The small space the atropine paper will occupy in the pocket is not the only convenience to be found in its use. It does not alarm timid patients as a bottle of drops (believed to be "caustic") and a quill, brush, or glass tube brought up to the eye does: children are often then quite intractable, and, if they cry, the atropine solution is often too much diluted to be of any use. The atropine paper, it will be observed, can never become a common mode of employing the agent by the patients themselves, for very few of them or their friends could be trusted to put the paper properly into the eye, or safely to wipe it out again. The atropine paper is, again I state, only brought forward by me for the use of the surgeon himself, chiefly for convenience, and also for greater efficiency in some cases in which the greatest effect is desirable.

The atropine paper, as I have described it, is prepared by Mr. Squire, chemist to Her Majesty, 277, Oxford-street, London,—he will, as I have requested him, send any one who will try the new vehicle, a specimen, by the post. The paper has been dipped in a solution so strong that a piece of it, one-fifth of an inch square, contains as much of the salt as a drop of the solution of two grains to an ounce of water. It is made up in little books with stiff covers, each page is an inch square, with black lines dividing it into fifths both ways; thus each page contains twenty-five doses. All the pages are cut through, in the horizontal lines, from the front edges

almost to the back, so the quantity required each time can be easily cut (or torn) off, in the vertical lines, from either of the horizontal strips into which the pages are divided.

THE BENEFICIAL EFFECT OF THE INSUFFLATION OF CALOMEL IN CERTAIN DISEASES OF THE EYE.

By Soelberg Wells.

The insufflation of calomel, in certain ophthalmiæ, but more particularly in specks of the cornea, was already recommended by Fricke, Mayor, and others. Gradually, however, it fell into disuse, until, within the last few years, its employment was again strongly advocated by Ruete, Von Græfe, Arlt, etc. I have seen it extensively used in the cliniques of Von Græfe and Arlt, and can, from my experience of it there, and in my own practice, completely endorse the high encomiums bestowed upon its action in certain affections of the eye.

It was long a debated point whether its specific action was that of a mechanical irritant, or whether it was chemical. With a view of settling this question Von Græfe instituted a number of experiments with the insufflation of other finely powdered substances (magnesia, etc.), but without any analogous result. Its action, therefore, appears to be chemical, some thinking that it acts specifically on the meibomian glands, others on the epithelial cells of the conjunctiva.

Its use is particularly indicated in the following affections:—

I. *In the different forms of phlyctenular or pustular* (or what is often designated scrofulous) *ophthalmia.* It is not only of very marked advantage during the presence of the disease itself, but it is also of the greatest use in preventing the constant recurrence of this affection, which forms such a source of discomfort and annoyance to the patient.

I think it, therefore, of consequence that the insufflation should be persisted in, at the interval of one or several days, according to the requirements of the case, even for some time after the disease itself appears cured; when its use is definitely abstained from, strict injunctions should be given to the patient to have the remedy at once re-applied, as soon as any symptoms of recurrence shew themselves. Although it should generally only be used when there is hardly any inflammatory irritation, I have often employed it with the greatest advantage in these cases of pustular ophthalmia, when there was considerable vascularity and some lacrymation. In such a case, however, we should see the patient every day, for fear that too much reaction might be set up. If this cannot be done it is better to abstain from its use until the amount of irritation has decreased. The insufflation of calomel is contra-indicated when there is great irritation, vascularity, photophobia, with very copious lacrymation: or if there are pustules or abscesses of the cornea.

II. *In the pannus due to phlyctenular corneitis.*—But if this form of pannus is accompanied by corneitis fasciculosa (frequently called scrofulous corneitis; the distinctive marks of the disease being an elevated infiltration, which is pushed forward towards the centre of the cornea at the extremity of a bundle or leash of vessels,) calomel should not be used as there is too much irritation, and red precipitate ointment should be employed. The indication for the use of the latter is, the presence of vascularity of the cornea, with no tendency to a general detritus (necrosis) of the corneal tissue.

III. *In the regressive stage of this fascicular or scrofulous corneitis* (when the infiltrations have disappeared) calomel is indicated, in order to prevent a relapse.

IV. *In phlyctenular corneitis* (sometimes called herpes cornea, also described as ophthalmia scarlatinosa, morbillosa, etc., as it is frequently met with during the period of desiccation in scarlatina, measles, etc.). At a later stage of this affection, when the severe inflammatory irritation, with its

increase of temperature, arterial hyperæmia, lacrymation, etc., has passed away, calomel often acts as a specific, almost as a charm.

V. *In various forms of opacity of the cornea,* more particularly if they are not too dense, or of too long standing, and if there is still some slight irritability of the eye, and where we fear a recurrence of the original affection. The great advantage of calomel in such cases is, that we can thoroughly regulate and control the degree of its action, which is also not too irritant.

The calomel to be used for insufflation should be very finely powdered and perfectly dry, so that it does not form clots on the conjunctiva or cornea, which are apt to act as mechanical irritants. It should be applied with a fine camel's hair paint brush, held between the thumb and forefinger, a slight fillip with the middle finger against the handle of the brush will jerk some of the powder into the eye. It should be applied every day, or every other day, according to the requirements of the case; if after its application the eyelids are much gummed together in the evening it should be employed less frequently. In children it is often exceedingly difficult to get anything into the eye, on account of their restlessness, or the intense spasm of the eyelids. In such cases it is best to place the head of the child between the knees of the surgeon, so as to fix it thoroughly, its legs and hands being held by an assistant, who sits on another chair opposite, the eyelids are then easily opened by the elevators, and the eye may be thoroughly examined, and the application, whatever it be, efficiently applied. Simple as this hint is, it is yet of importance, as all will admit, who have witnessed the, but too often, vain endeavour to gain a glimpse at the cornea or to apply some lotion, etc., in some of these cases.

ON PARACENTESIS OF THE CORNEA.

By Geo. Lawson, F.R.C.S.,
Surgeon to the Great Northern Hospital; Clinical Assistant to Mr. Bowman.

The following cases, taken rough from my note-book, serve well to illustrate the advantage of tapping the anterior chamber of the eye in cases of sloughing ulcers of the cornea, or of ulcers which refuse to heal under other modes of treatment; in cases of onyx, or of ophthalmitis with hypopion.

The operation is a simple one, and best performed by the manner usually adopted by the surgeons at Moorfields, viz., by passing a broad needle through the cornea at its lower margin, keeping the point well forward towards the cornea, to avoid wounding the lens, and then suddenly turning it on its edge so as to allow the aqueous to run off, and rapidly withdrawing it, as soon as the iris approaches the cornea.

The indications which call for this line of treatment may be briefly stated.

1st. Increased tension of the globe. The eye, in any of the above-mentioned cases, may have its tension slightly increased, and this seems, in a great measure, to depend on an increased secretion of the aqueous, for the anterior chamber becomes deepened; and this is specially observable when contrasted with that of the other eye, and the iris, instead of presenting a plane surface, slopes backwards.

2nd. Deep ulcers which threaten to perforate the cornea will often rapidly assume a healthy action after the tension of the cornea has been diminished by letting off the aqueous humour; and sloughing ulcers will, under the same treatment, derive similar benefit.

That this benefit is often only transitory is true, but the operation is so simple, that it may be repeated an indefinite number of times, if the patient after each derives relief.

3rd. In cases of onyx or pus between the laminæ of the cornea, the relief of the tense state of the cornea promotes absorption, and relieves pain, and so places the eye in a favourable condition for complete recovery. An onyx which threatens to burst backwards, can be most safely combated by tapping the anterior chamber of the eye in addition to the use of other remedies.

4th. This operation relieves pain, and, if carefully and properly performed, can do no harm. The relief of pain is so remarkable, that patients, on their next visit to the hospital, will, unasked for, relate the great benefit they derived from what had been done to the eye; but at the same time they will often state that after about twenty-four hours the pain was nearly as bad as ever. The truth being that the aqueous had become completely restored, and that the tension which called for the first tapping was as great as ever.

The operation in such cases should be repeated.

Case I.—Ophthalmitis from an injury. Hypopion. Great relief from tapping anterior chamber.

H. G., æt. 40, by trade a gasfitter, applied to the Moorfields Hospital on July 10th. He states that, eleven days previously, while running a lead joint, a splash of gas water entered the eye; this was followed by severe pain, but he managed to continue his work for four days after the accident. The pain increased greatly, being most intense in the eye and around the orbit, obliging him to cease from work, and to apply to the Hospital for relief.

Present condition.—The whole globe is much injected, and the cornea abraded nearly opposite the pupil. The aqueous is turbid; there is total posterior synechia and hypopion. The tension of the globe is increased.

Treatment.—The anterior chamber was tapped, and the aqueous with the lymph let off; and he was ordered to use hot fomentations, and to drop into the eye a solution of atropine, gr. i. ad ʒii. twice a day.

July 13th.—He states that all pain ceased immediately after the tapping. The eye is very much quieter, and he has no pain. This patient quite recovered, and had a very useful eye.

Case II.—Corneitis, with ulcer of the cornea. Anterior chamber tapped. Good result.

J. G., æt. 17, applied to the Hospital on April 1st. She was suffering from corneitis, with a deep central ulcer of the cornea. The girl was very feeble and much out of condition, from long watching and anxiety, consequent on the illness of her mother. From the commencement of the attack to the present date was three weeks. The globe was very painful, the anterior chamber deepened when contrasted with that of the other eye, and the iris thrown backwards.

She was ordered—

Liniment. Belladonnæ to the brow,
Mist. Quinæ ter die,

and the anterior chamber was tapped, and the aqueous run off.

April 5th.—States that she derived much ease from the tapping, and is now quite free from pain. Ulcer looking better.

April 12th.—Still improving; ulcer healing.

She soon quite recovered, leaving only a slight opacity to mark the site of the ulcer.

Case III.—Sloughing ulcer of the cornea. Anterior chamber tapped. Good result.

A. P., æt. 30, married, came to the Hospital on April 22nd, with an ulcer on the cornea. She was very feeble, and much out of health.

She was ordered Mist. Quinæ, and some slight aperient.

On her next visit to the Hospital on April 25, the report states that the eye was not so well; the ulcer had a sloughy appearance; that the iris was pushed backwards, and the anterior chamber deepened. The eye very painful.

The anterior chamber was now tapped.

She was ordered to continue Mist. Quinæ, and to take Pil. Sapon c. Opio, gr. v. o n.; and Gutt. Atrop. gr. i. ad ʒi. dropped into the eye three times a day.

April 30th.—Very much better; free from pain. Ulcer looking healthy.

May 3.—Ulcer nearly healed.

Case IV.—Corneitis, with sloughing ulcer of the cornea. Anterior chamber tapped. Recovery.

M. D., æt. 56, married, was admitted an out-patient on September 6th, suffering from corneitis, with a large irregular sloughing ulcer of the cornea at its lower margin. The eye had been affected about five weeks before she applied to the Hospital. The anterior chamber was very deep, particularly when contrasted with the other eye; the pain in the eye very severe. She was very feeble, and the pulse small and quick.

Treatment.—Anterior chamber tapped.

Mist. Quinæ ʒi. ter die,

Gutt. Atrop. gr. i. ad ʒi. bis die gutt.

Sept. 10th.—Great relief, she states, was derived from the tapping; but in two days time the eye was as painful as ever. The anterior chamber still very deep, and the ulcer uneven and sloughing.

Anterior chamber again tapped.

Rep. omnia.

Sept. 12th.—Much better; all pain has ceased. Ulcer looking much more healthy, and inclined to heal.

Sept. 17.—Ulcer nearly healed. The greater part of the cornea clear.

Case V.—Corneitis, with onyx.

G. D., æt. 10½, applied to the Hospital March 23, suffering from corneitis of the left eye, with onyx.

In the outer part of the cornea, extending from the pupil to its circumferential edge, was a large opaque patch, caused by pus between the laminæ of the cornea. It occupied about a fourth part of the cornea.

From the commencement of the attack it was fourteen days. The anterior chamber was increased in depth, and the eye very painful,

Ordered,— Fotus papav.,

Pulv. purgans.

and the anterior chamber was tapped.

March 27.—Feels very much better; the eye is more quiet, and he is free from pain.

Ordered:—Liniment. belladonnæ.

April 17.—The report states he is now well.

Part II.

Reviews.

THE DISPLACEMENT OF THE PUPIL BY IRIDODESIS.

By Dr. Pagenstecher.

Archiv. f. Ophth. Vol. VIII. Part. i. Page 193.

In this article the author records the results he has obtained during the past year by this operation, in certain faulty conditions of the cornea and lens. He shows that iridodesis is very efficient in diminishing the sensible effects of dispersion, which even slight opacities of these media produce in a distressing degree, and on this account is preferable to iridectomy, even where only a very narrow piece of iris is excised; and that it may be practised with most advantage in the stationary form of nuclear cataract, called "cataracta zonularis,"

Dr. Pagenstecher prolapses the iris through a puncture in the sclerotic; by making the puncture here instead of in the cornea, he avoids advancing the plane of the iris from the lens, and retains it in the most advantageous situation for excluding diffused light. This is certainly an improvement on the operation, as it was originally devised by Mr. Critchett. Dr. Pagenstecher pulls out the iris until the pupil is quite removed from opposite the opacity, whether this be in the cornea or lens. We have not found Schufts' forceps for tying the prolapsed portion of the iris, which he recommends, so handy as a couple of common broad-pointed cilia forceps. The appendix of cases deserves to be carefully read.

Part III.

Minor Contributions, etc.

CASE OF CYSTICERCUS (TELÆ CELLULOSÆ) IN THE ANTERIOR CHAMBER OF THE HUMAN EYE.

By John Windsor, F.R.C.S., &c.,

Senior Surgeon of the Manchester Eye Hospital.

Sept. 13th, 1861.—I visited Mary Cottenham, æt. 23, married, residing at 2, Platt-street, near Rochdale-road, Manchester.

She had in the anterior chamber of her left eye a substance about the size of a small pea. I at once detected it to be a cysticercus, lying partly over the inferior and outer portion of the pupil, and partly on the adjoining iris, in about equal proportions. It presented a circular outline. On viewing it with a double convex lens, there appeared a duller-looking or more opaque margin all round, the rest appearing somewhat translucent except in one point of it, inferiorly and outwardly where a small darker looking beak distinctly projected. She has no pain, and there is no appearance of inflammation of the eye, but her vision is not quite so good with this as with the other, as the cysticercus to a certain extent lies over the pupil. On passing my finger over the closed eyelids, I could easily move the body from the inferior to the superior part of the anterior chamber; but, on removing the pressure, it immediately descended to its former situation. It could also, by similar pressure, be moved from the outer-inferior to the inner-inferior part of the anterior chamber, with the little beak (its head and neck) then projecting inwards, towards the nose, instead of outwards, but it soon resumed its usual situation. She remarked that in noticing it through a looking-glass, it seemed occasionally to retract, and at others to project the little beak, in form something like a pin-point.

She says, that about nine weeks since, a day or two after her fifth confinement, the left eye became painful and inflamed. The surgeon who attended her in her accouchement prescribed a lotion, but the inflammation continuing, two leeches were applied about a week afterwards, and then she was quite relieved, and

the vision was moderately good, except in a strong light, yet not equal to that of the other eye. In about a fortnight afterwards, the appearance of something within the eye was first noticed, and it has since remained in the same situation. The pupil is of moderate size, about equal to that of the other eye.

Sept. 20th.—I have seen her two or three times since the 13th instant, but there is no change in the eye, or in the situation of the cysticercus. She says that for some time she has been in the habit of living chiefly on bacon, taken with her tea and bread, but she has never noticed that the former was in a measly state. She has, however, a few times since her confinement, noticed in her evacuations some joints of tape-worm. I prescribed for her a turpentine emulsion.

Sept. 23rd.—After taking the first dose of the mixture, she passed several joints of the tænia solium, which were reserved for my inspection. No change in the eye.

Sept. 29th.—A second dose of the mixture was taken yesterday, but no worm could be detected in the evacuations.

Oct. 2nd.—The case was exhibited at the meeting of the Manchester Medical Society, so that a considerable number of the members (30 to 40) had a full opportunity of examining it.

Oct. 22nd.—The eye is just in the same state, only that the beak of the cysticercus (about as long as the cyst) is now directed vertically instead of obliquely downwards.

A third dose of the turpentine mixture has been taken without bringing away any more tænia.

Nov. 6th.—She came to my house, and was desirous of having the little body removed, as every now and then, by its movements over the pupil, it impeded her vision. In order to avoid the cysticercus being touched, I divided the cornea on the temporal side to the extent of one-third to one-fourth of its circumference. As the incision was being completed, the little body entire was projected upon the patient's forehead. I preferred making a small flap of the cornea at once, rather than a linear incision (although the latter might possibly have sufficed,) in order to secure a free outlet for the intruder. This was put into a little diluted glycerine, and I had the opportunity of exhibiting it a second time, the evening of its extraction, to the Medical Society.

As she felt considerable pain from the operation, I gave her an opiate draught, and prescribed her some opiate pills, to take one every four hours, until the pain was gone. The eye was covered with some tissue plaster.

Nov. 7th.—She walked home, about a mile's distance, and is up this morning, feeling pretty easy.

Nov. 11th.—On examining the eye to-day, the cornea appeared healed, and the external tunics but slightly injected, the pupil rather large and nearly circular, the crystalline clear, and vision good.

Nov. 27th.—Continues well, no inflammation of the eye, pupil large and clear, vision good. The only difference from the normal state is a very slight deviation of the pupil downwards and outwards.

I purpose, shortly, to submit the cysticercus (preserved) to a more minute microscopical inspection.

In conclusion, I may remark, that although I have been attached to the Manchester Eye Hospital since the year 1819, this is the first case of cysticercus cellulosæ which has come under my notice.

CASE OF CYSTICERCUS WITHIN THE EYE. UNDER THE CARE OF MR. BOWMAN.

Reported by Soelberg Wells.

Emily Hopgood (æt. 11), was admitted an in-patient of the Royal London Ophthalmic Hospital, Dec. 6, 1861. She had completely lost the sight of the right eye. About six months ago she found the sight of this eye getting a little dim; there was at the same time a little pain and slight inflammation, both, however, soon subsided, but the sight became gradually worse, and until it was at last totally extinguished.

The eye now presents the following symptoms.

It is a little harder than normal, the sclerotic is turgid, thinned, and of a bluish colour in the whole of the ciliary region; the cornea is clear; the pupil very widely dilated so that at the first glance there appears to be no iris at all, with the oblique illumination a very narrow rim of the iris may, however, be observed. The lens is clear. Even with the naked eye a paste-coloured reflecting mass may be seen to occupy the fundus, lying a very little way behind the lens, either in the vitreous humour or beneath the retina. On ophthalmoscopic examination it is seen to occupy the whole of the fundus. Its colour is that of gruel, and from its central part very fine vessels may be seen in or near its surface, diverging upwards and downwards for some distance. They are pale with a somewhat hazy and clouded outline, so that they appear to be just beneath the surface of the mass.

Mr. Bowman has often insisted on the aid of the diagnosis of disease, encroaching on the vitreous region of the eye, derivable from the character of the vascularization, as observed by the ophthalmoscope, or by the aid of a lens, concentrating the light of a taper on the surface of the diseased part, where the media in front of it are still transparent. If the vessels exhibit the general arborescent type of those of the retina, little doubt

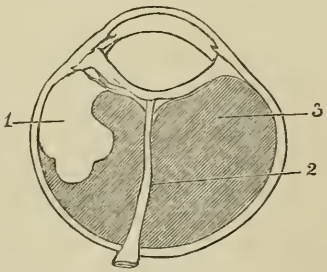
can exist as to the structure to which they belong; whereas if they empty themselves towards several distinct centres, or emerge on the surface under observation from several separate points, they are more likely to pertain to a malignant or other vascular adventitious growth projecting in front of the retina, or developed within its tissue. In the present instance, the indication afforded by the vascularization was ambiguous. The nature of the disease was obscure, but there was a probability of its being a malignant growth from the choroid or retina.

Before proceeding to the excision of the globe, Mr. Bowman explained, however, that the expediency of this proceeding by no means rested on the supposed malignancy of the disease. The eye was already destroyed as an organ of sight; it was undergoing rapid distension, and would be, ere long, the seat of more severe suffering; to remove it altogether was for the patient by far the simplest and most satisfactory proceeding, for if a partial operation (abscission or evacuation of the contents) were performed, there would be a less rapid and probably more painful recovery, with no countervailing advantage to a person in her class of life; whereas, in case of malignancy being found, the surgeon would much regret his having lessened his chance of a perfect extirpation of the disease.

The subjoined report of the dissection is by Dr. Bader.

December 26, 1861.

P. M.—The eye was opened by Mr. Bowman immediately after excision, by carrying a section through its tunics and through the optic nerve, which on reaching the equator of the eye, was discontinued. A considerable quantity of yellowish clear and very sticky fluid had escaped before the section was completed. The sclera and choroid were in opposition; their curve, colour, and thickness appeared normal; the latter was of a deep uniform brown colour, as one would expect in a young patient, with deep brown irises. The retinal surface of the choroid appeared smooth; the greater part of the retina was separated from this surface; the intervening space being occupied by the clear yellow fluid, which escaped on opening the eye. The retina was changed into a greyish translucent cord-like substance, which from its attachment at the retinal aperture, extended towards the middle of the hyaloid fossa; but a little beyond the equator of the eye it spread out over the remaining contents of the vitreous space, and continued its course towards the ora serrata.



The vitreous within the area of the retina had been destroyed. The vitreous space within and at some distance behind the area of the ciliary processes was occupied by a yellowish strongly translucent (× 200 fibrous) substance, much exceeding in consistence that of the vitreous. In several parts of this tissue, and at different depths, were seen yellowish opaque pinhead-sized roundish masses (× 200 conglomerations of chalk granules, and of granules of uncertain nature), surrounded by a delicate network of capillaries, which to the ophthalmoscope appeared as rosy and yellowish spots, suspended and fixed in the vitreous space. A roundish smooth elevation of the detached retina of the size of a small pea was noticed at its outer and upper portion near the ora serrata; some greyish translucent fluid escaped from it when punctured. On minutely examining this elevated portion it was found to be the retina. The head hooklets and the slender neck of a cysticercus could distinctly be recognized on its inner (vitreous) surface. The fluid had been accumulated between the latter and the contents of the vitreous space. I was unable to trace the relations between the cysticercus, the retina, and the fluid which had led to its vesicular elevation.

The membrane, which lined the vitreous surface of the ciliary processes (generally described as suspensory ligament) was thickened (from $\frac{1}{4} - \frac{1}{2}$ of a line), grey and opaque. The lens was transparent; the iris, reduced to a narrow rim, adhered to the lens-capsule; the anterior chamber was much reduced in size.

The retina, on minute examination, appeared greyish, strongly translucent, amorphous and thickly sprinkled with black pigment molecules; its blood-vessels, beyond being much flattened, show no peculiarities. With the binocular microscope a certain order could be observed in the arrangement of the pigment molecules; they occupied the seat of what is termed the granular layer of the retina. I frequently noticed this change, and can offer no other explanation for the disappearing of the granular layer, except the shrivelling up of the individual granules into these pigment molecules. The dilated irregular state of the pupil I attributed to the paralysis of the ciliary nerves, which latter was caused by the inflammatory changes in the ciliary processes, and on their vitreous surface. The conglomerations of chalk observed in the vitreous space may be remnants of destroyed cysticerci. These entozoa led to atrophy of the vitreous, displacement of the retina, and to the inflammatory changes upon and in the tunics of the eye.

I have examined other eyes where the yellow reflection from behind the pupil had been due to similar changes in the displaced retina and in the vitreous space, but in none could I discover any floating shreds or membranes behind the lens, as are seen when the yellow reflection is caused by new growth, and by softening, &c. of the adjoining vitreous.

PROTRUSION OF THE EYE-BALL AND CONSEQUENT DIPLOPIA, DEPENDENT UPON AN INTRA-ORBITAL CYST.

By Freeman J. Bumstead, M.D.,

Surgeon to the New York Eye Infirmary.

Frances Ellison, aged 23, came under my care at the New York Eye Infirmary, March 25, 1859, for protrusion of the left eyeball. The history of her case, as related by herself, was as follows:

When about three years of age, she one day ran in from her play upon the door-step, with her hand covering her left eye, and complaining of severe pain. Her mother found the eye protruding from its socket, and "put it back again in place." According to the testimony of the elder children playing with her, she had received no injury, but the protrusion had suddenly taken place, without apparent cause.

Notwithstanding the replacement, said to have been effected by the mother, the eye appears to have continued somewhat protuberant, "the more so whenever she caught cold," but did not greatly disfigure her until after an attack of scarlet fever at the age of seven years.

When eight years old, she was placed under the care of the late Dr. William Clay Wallace, the discoverer of the circular fibres of the ciliary muscle. Patient states that, at this time, the protrusion was excessive, so that "nearly the whole globe hung down upon the cheek," and that she was exhibited to a number of surgeons as an extraordinary instance of exophthalmos. The treatment adopted by Dr. Wallace consisted in the introduction of a seton through the cyst, passing through the upper lid. This was worn for ten months, with the effect of causing the globe to recede to such an extent that the protrusion was scarcely perceptible, and this favourable condition had continued until the autumn of 1858, when the eye began to advance again, and pain, felt especially when using the eye, obliged her to relinquish her occupation as a seamstress.

At the time of patient's first visit to the Infirmary (March, 1859), the left eye was found protruding forwards and downwards, and the upper lid was very prominent, imparting to the touch a feeling of obscure fluctuation. Upon raising the upper lid, it was evident, from the discoloration of the ocular conjunctiva and its elevation above the globe, that the protrusion was due to the presence within the orbit of an encysted tumour,

which was advancing externally above the eyeball. Vision was unimpaired; but no little annoyance was occasioned by the accompanying diplopia.

The success of the treatment adopted by Dr. Wallace led me to adopt the same means, and I accordingly inserted through the upper lid and cystic walls a seton of four strands of iron wire. About a drachm of dark-coloured fluid, containing flakes of greyish, cheesy material, and presenting under the microscope blood corpuscles, granular matter, and cells filled with granules, escaped from the points of puncture. The eye at once receded perceptibly; the bluish discolouration of the conjunctiva disappeared, and in a few days complete relief from the pain was obtained. From the small amount of purulent discharge excited by the seton of iron wire, too little irritation of the cystic walls was thought to be produced, and a silk seton was substituted, which was occasionally encased with the compound iodine ointment, and was worn until June 1st, 1859, when, as it appeared to have accomplished all the good of which it was capable, it was removed. The patient was now free from pain, and the eye, although far from having returned to its normal position, was much less prominent than at her first visit.

Patient has since called upon me from time to time that I might be able to watch the progress of her case. No material change, however, has taken place; the eye remaining in the same condition as upon the withdrawal of the seton. Vision in affected eye continues good, and no inconvenience is experienced except from diplopia. In June of the present year (1861), I embraced the opportunity of studying the double images, after the usual manner, by placing the patient in a darkened room, with a red-coloured glass before the right and sound eye, and noting the changes which took place in the images as a candle was carried from the extreme right to the extreme left, and from the level of the floor upwards as high as the arm could reach. The following Table, which was verified by repeated examinations, will exhibit these changes.

In examining this Table, we find,

1. The chief influence of the tumour upon the position of the left eye is to depress its horizontal meridian; this influence being more marked in the upper than in the lower half of the field of vision, and towards the left than towards the right of the patient. Thus we find that the vertical separation (the white being the higher) increases from below upwards upon the left of patient, from 3 to 11 and 20 inches; in front of patient, from 1 to 5 and 9 inches; and a similar increase is noticed in proceeding from right to left.

2. The influence of the tumour upon the vertical meridian is nul in the horizon. Below to the floor, the vertical meridian of the affected eye is slightly carried inwards, producing convergent strabismus; while above, it is carried outwards, causing

divergent strabismus; as shown by the homonymous and crossed images respectively.

Patient sitting, with red glass over right eye. Distance of candle = 10 ft. Candle moved from extreme right to extreme left, a space = 10 ft. The terms "right" and "left" are used as respects patient. "Distance" refers to apparent distance from patient of the two images.

Left above at arm's length.	*Middle above.*	*Right above.*
Lat. sep. = 3 in. images crossed. Vert. sep. = 20 in. W. above. Distance no difference. Both flames vertical.	Lat. sep. = 2 in. images crossed. Vert. sep. = 9 in. W. above. Distance, no difference. Both flames vertical.	Lat. sep. = 2 in. images crossed. Vert. sep. = 6 in. W. above. Distance, no difference. Red flame vertical, W. points to right, tip of W. being ½ inch farther away than its base.
Left horizon.	*Middle horizon.*	*Right horizon.*
Lat. sep. = 0. Vert. sep. = 11 in. W. above. Distance, no difference. Both flames vertical.	Lat. sep. = 0. Vert. sep. = 5 in. W. above. R. one inch nearer. Both flames vertical.	Image single, even when candle is carried 8 inches above the horizon.
Left below to floor.	*Middle below to floor.*	*Right below to floor.*
Lat. sep. = 3 in. images synonymous. Vert. sep. = 3 in. W. above. R. is 14 in. nearer the W. flame. Both vertical.	Lat. sep. = 1 in. images synonymous. Vert. sep. = 1 in. W. above. Red is "a little" nearer than white. Both vertical.	Image single.

3. Again, the influence of the tumour upon the position of the V. M. of the left eye is evinced, as the eyes are directed diagonally upwards and to the right. As shown by Von Graefe,

when this motion is executed by healthy eyes, the V. M. M. are inclined parallelly to the right. In the present instance, this inclination is obstructed in the left eye, the V. M. of which remains straight, or nearly so. The parallelism of the V. M. M. is therefore destroyed, and the two images upon the retina converge at the top; but, "as in conformity with the laws of normal vision, the image falling in the slanting meridian of the healthy right eye appears straight to the patient, the image of the affected eye necessarily seems to her slanting."* In all other positions than the one mentioned the V. M. M. remain parallel.

4. But one other phenomenon, the explanation of which is attended with much greater difficulty, remains unnoticed; I refer to the apparent difference in the distances of the two images in certain positions of the candle, viz., to the patient's "left below," "middle below," and "middle horizon;" in all of which the white flame of the protuberant eye is referred to a farther point than the red image of the sound eye.

It is well known, that the same phenomenon attends paralysis of the superior oblique muscle, in which the *pseudo* image seems nearer to the patient than that of the healthy eye; and that it has been explained by Von Graefe upon the supposition that the eye, freed from the traction forwards of the superior oblique, is drawn more deeply into the orbit by the unopposed action of the recti. In the present instance, the diseased is in advance of the sound eye, and the image of the former is referred to a more distant point than the image of the latter; but it is evident that the phenomenon in question cannot be satisfactorily explained by the exophthalmos alone, otherwise it would be constant in the whole field of vision, whereas it is limited to the three portions above mentioned.

I fancied at one time that I had discovered the solution of this difficulty in the projection of the two images upon the horizontal plane of the floor, whereby the superior would naturally be referred to a more distant point than the inferior; but, ignoring the fact that this explanation did not suffice for the difference in the distances in the "middle horizon," I found, upon placing the patient in the recumbent posture, so that when looking towards her feet the images would be projected against the wall, that the same difference in their apparent distances existed. I was obliged, therefore, to relinquish this idea, and must confess my inability to furnish a satisfactory solution. One object, however, in publishing this case, has been to add to the known facts upon which, it is hoped, a reliable explanation of the phenomenon in question will, at no distant time, be based.

I have only to add, that the diplopia in this case is entirely overcome, and the two images are united by a prism of 8°, with

* Dr. John S. Wells, Ophth. Hosp. Repts., vol. ii. p. 140,

its base directed upwards and inwards. I have had such a one made for my patient, which she is now wearing with very great comfort.

CASE OF CATARACT AND DIABETES.

By W. P. Swain, Esq.,

Surgeon to the Devonport Dispensary and Institution for Diseases of the Eye and Ear.

The dependence of cataractous, lenticular opacities, on diabetes is no longer doubted. Græfe asserts that he has found them present in one quarter of diabetic cases under his care. As to whether the surgeon is justified in having recourse to operative measures is, however, a question still under discussion, and of no little importance to the well-being of the patient, and the credit of the surgeon. The following case may, therefore, be well put on record:—

Jane B——, æt. 39, widow of an agricultural labourer, came to the dispensary on August 10, 1861. She was, in September, 1859, attacked with all the symptoms of diabetes, and was under medical treatment for that disease for some period, with slight improvement. About the middle of the year 1860, her vision became impaired. She was unable to read, and eventually to distinguish features. She has now perception of light only. She is much emaciated, P. 112. Tongue red, bowels confined and lumpy, breath of a peculiar sweet odour, pain in loins, passes three quarts of water in the 24 hours, much charged with sugar. Sp. g. 1050. She is not able to find her way about, and her blindness, caused by soft cataract, preys much upon her mind. She is most desirous of having something done to restore her sight. Under these circumstances I resolved to operate, and on Saturday, August 17th, I performed Schuft's operation on the right eye. The nucleus was small, and the whole lens easily removed. She was able, immediately after the operation, to distinguish objects in the room, and could see the ring upon my finger. After the operation she had little or no pain. I kept both eyes closed for a day or so. No inflammation supervened, and at the end of a week, with her consent, I performed the same operation on the left eye. As on the former occasion the lens was removed without difficulty; little pain was felt, and no inflammation set in. She remained in town for about a week, and during the whole of her stay, having been kept on good meat diet and bran biscuits, her constitutional symptoms were much improved, and, on September 3rd, she went into the country. On September 21st, three weeks

after the second operation, I again saw her, and fitted her with a pair of cataract glasses, with which she was able, with ease, to read ordinary small type. Her spirits are much improved, and in every respect she is better. The water has diminished to two quarts in 24 hours. I have no hope that she will, in her position of life, for any very long period, resist the inroads of so fatal a disease as diabetes; but of this I am confident, that I have much lessened the burthen of her days at the expense of very little pain to her, and trouble to myself. From a solitary case no general rule can be deducted, but its record may perhaps induce others to follow my example, both in operating in such cases and recording the result.

20, Ker Street, Devonport,
October 15th, 1861.

A CASE OF CONGENITAL DERMOID TUMOUR AT THE EDGE OF EACH CORNEA.

Under the care of Mr. Bowman.

REPORTED BY

Soelberg Wells, *Clinical Assistant to Mr. Bowman.*

Wm. Hillebrandt, (æt. 26), was admitted as out-patient (Dec. 10) at the Royal London Ophthalmic Hospital.

In each eye there was a small dermoid tumour at the outer edge of the cornea, passing from the sclerotic over the edge of the cornea, about two-thirds being situated on the sclerotic and one-third on the cornea. These little tumours were circumscribed, their edges being slightly but distinctly elevated above the surface; they were movable, and each had a little hair in its centre. They were almost symmetrical, the tumour in the right eye being situated at the outer edge of the cornea exactly in the middle line; the one in the left eye was also situated at the outer edge of the cornea, but slightly below the middle line. They were congenital, and had not increased at all in size.

A remarkable coincidence was, that in a line with these tumours there was another little circumscribed congenital dermoid tumour just in front of the left ear opposite the tragus; the latter was also somewhat enlarged and thickened, the tragus of the right ear was also slightly enlarged.

These congenital dermoid tumours are not very uncommon; they are generally situated partly on the sclerotic and partly on the cornea; they vary much in size at least, but do not generally increase in size. The largest I have seen was in Von Græfe's Clinique; it extended over the outer two-thirds of the cornea,

and was very unsightly. Von Græfe removed it very successfully. He considers that these tumours are well removable from the cornea if we do not attempt to clear them too thoroughly, for they are frequently so interwoven with the corneal tissue, that it is impossible to remove them completely without running the chance of going too deeply and entering the anterior chamber. Some opacity of the cornea will remain after the operation, but this is far less observable than the tumour, which is generally, if at all of large size, very disfiguring.

The patient did not apply on account of the tumours, but because he was unable to read, &c., for any length of time without experiencing all the symptoms of asthenopia. On examination I found that he suffered from hypernitropia in both eyes. The degree of hypernitropia was = to $-\frac{1}{18}$ in both eyes before the paralization of the ciliary muscle by atropine; *i. e.*, convex glasses of 18 inches focus were the strongest with which he could see well at a distance.

Dec. 17.—He was accompanied by his mother to-day, who stated that at birth two other little dermoid tumours existed, one in front of the tragus of the right ear, the other in the loose skin at the outer canthus of the right; both were removed during infancy; of the one at the outer canthus a small portion, however, still remained. She would not allow the corneal tumours to be removed, as she had formerly been told by some medical man, that if they were ever operated upon vision would be destroyed! As the sight was not at all influenced by them, there was, of course, no reason, except a cosmetic one, for advising an operation.

MISCELLANEOUS CASES, &c.

By J. W. Hulke.

I.—CONGENITAL DERMOID TUMOUR UPON THE CORNEA AND SCLEROTIC.

A small tumour, of the size and shape of a split pea, was given me for examination by Mr. Bowman, who had removed it from the eye of a young lady, æt. 19. It had existed from birth, and was seated on the lower and outer quadrant of the cornea, and neighbouring sclerotic, to which part it adhered with some firmness. The cornea exposed on its removal was transparent, but became cloudy during cicatrization. The little growth was composed of the elements of true skin, areolar tissue, hairs, and sebaceous follicles.

II.—CONGENITAL DERMOID TUMOUR UPON THE SCLEROTIC.

A healthy girl, æt. 16, came under my care, March 23, 1860, with a fleshy tumour, nearly the size of a small horse-bean, lying on the upper and outer quadrant of the front of the sclerotic. It was freely movable upon the globe; its lower border approached to within a line and-a-half of the cornea; its upper was not exposed when the upper eye-lid was pulled upwards as much as possible. The conjunctiva adhered to the summit of the little tumour, which was exposed to the air when the eyelids were open, and resembled skin; from this point there sprang a tuft of long fine hairs. Elsewhere the conjunctiva was movable upon the tumour, and had a natural appearance.

The conjunctiva was slit up and the tumour dissected from the globe with a scissors. No portion of the mucous membrane was removed, excepting at the spot where the hairs grew. The same elementary tissues were present in this as in the preceding case.

January, 1861.—The scar is scarcely visible, and quite supple, offering no check to the movements of the globe or eyelid.

III.—COLOBOMA OF THE OCULAR TUNICS.—PERMANENCE OF THE EMBRYONIC FISSURE.

Congenital fissure of the ocular tunics has been found to be of not infrequent occurrence in conjunction with the well known deformity, Congenital cleft of the Iris, Coloboma Iridis. Cases of this kind have been recorded in the A. f. O., but as these are not generally accessible to English readers; a case which came under my observation in the autumn, seems sufficiently interesting for publication.

Von Ammon, in his account of the development of the eye, tells us, that the first trace of this organ is a groove, then a canal, which, becoming bent in a circle, at length forms a sphere, divided by a fissure that runs from back to front, from the situation of the cornea to that of the insertion of the optic nerve. The edges of this embryonic cleft first meet at its lowest point, and by their union they form a raphé which divides the original cleft into an anterior and a posterior portion, of which the former is usually less and unites more rapidly than the latter, leaving, however, for some time longer, a small chink in the ciliary region. The closure of the posterior portion of the cleft proceeds more slowly, and in a backward direction from the raphé towards the future insertion of the optic nerve, where,

for a long time, an oval aperture remains, by which the nerve is brought into communication with the retina.

The union of each of the three tunics, which collectively form the edges of the fissure, when regular, occurs simultaneously with that of the other two, but Von Ammon has seen exceptions to this,—the choroidal fissure being closed whilst the retinal fissure persisted. When the whole extent of the embryonic cleft has closed, the raphé in the human eye becomes effaced, but in birds a permanent trace remains. Instead of coming into immediate union, the edges of the cleft are sometimes joined by an intermediate membrane, and when this occurs an outward bulge of the membrane is not rare; this happens usually towards the posterior extremity of the cleft, near the optic nerve, and forms the swelling known as the "Protuberantia seleralis," but it may also happen in front.

This defective closure of the embryonic fissure of the coats of the eyeball, from its analogy to coloboma of the iris, is distinguished by the term coloboma of the choroid, retina, etc.

The ophthalmoscopic sign is a conspicuous oval, or pear-shaped, whitish figure, reaching from the optic disc forwards along the floor of the fundus towards the narrow extremity of the cleft in the iris. Where the malformation reaches its maximum the round end of the figure includes the optic nerve-entrance, which is distinguished from the rest of the pyriform figure only by its different colour, and by the presence of the retinal vessels. In less extreme cases the rounded end of the figure is separated by a belt of natural choroid from the optic disc. Commonly the anterior, narrow end of the white oval is connected by a dark raphé with the cleft in the iris; a direct continuation appears to be rare. The walls of the globe which correspond to the figure project outwards beyond the general curve, to an extent which varies in different cases.

CASE OF COLOMBOMA OF THE IRIS, CHOROID, RETINA, AND OPTIC NERVE-SHEATH.

Sarah Ann B., a very intelligent child, æt. 12, of fair complexion, was brought to the Royal London Ophthalmic Hospital, September 14, of this year, with the congenital defects in both eyes. So far as I could learn by enquiry, the eyes of both her parents, as also those of her five brothers and only sister, were naturally formed. Her eyes were rather small, and the conjunctiva overcrept the corneæ rather more than usual, which, it will be seen, prevented a complete observation of the internal defects; on the left cornea, above and outwards from the pupil, there was a small circular nebula.

A cleft which divided the iris in a downward and inward direction gave the pupils a key-hole shape; their position was excentric, the iris opposite the cleft being about twice and a half times as broad as that which formed the margins of the cleft. The sphincter pupillæ was broad and well marked opposite the cleft, but it became narrow near the cleft at each side of which it ended in an angle that projected nearly one-third of a line in the direction the sphincter would have taken if its continuity had not been interrupted. In this way the circular aperture of the pupil proper was incompletely separated from the gap below it. The inner ends of the radiating system of fibres forming the edges of the cleft, struck the sphincter of the pupil nearly at a right angle; but the peripheral termination of these fibres could not be made out, owing to the unusual development of the corneal conjunctiva. So far as they could be traced, the sides of the cleft continued slightly to diverge.

The ophthalmoscopic examination of the fundus revealed a pear-shaped whitish figure, the larger rounded end of which included the optic disc; whilst the tapering part reached forwards along the floor of the eyeball to the ciliary region, to the immediate neighbourhood of the cleft in the iris; but whether it was continuous with this, I am unable to say.

The rounded end of the figure was bounded above the upper and outer half of the sclero-choroidal ring; below this the sides of the figure were formed by sharp, slightly sinuous converging lines, along which the choroid was surcharged with pigment. At a distance from its upper limit, about equal to once and a half the diameter of the optic disc, the rounded end of the figure was incompletely separated from the tapering part by a ragged angle of highly pigmented choroid, which jutted in from the sides. In front of this the edges of the figure were less regular in outline, becoming jagged in the ciliary region. I am disposed to believe that the ciliary processes were absent. Along the entire outline of the figure the choroid was surcharged with pigment.

The lower and inner half of the sclero-choroidal ring was absent, and that portion constituted by the optic disc distinguished itself from the rest of the figure, which was pearly silvery white, principally by its pinkish-grey, duller colour, and by the presence of the retinal vessels. The upper half of the retina received two principal arteries, one from the centre of the optic disc, the other from near its upper edge; and it returned its blood by several veins which coalesced in two large trunks that escaped from the inner surface of the fundus at the centre of the optic disc, and could be followed for some distance in the vertical part of the nerve. The lower half of the optic disc gave several vessels to the corresponding half of the retina of much smaller calibre than those distributed upwards. In addition to these vessels, which seemed to be derived from the arteria and vena centralis, there were others which pierced the silvery area of

the pear-shaped figure, and of these three sets were distinguishable,—1. Slender vessels running over the optic disc and adjacent parts of the silvery figure; 2. Larger freely anastomosing vessels continuous with the neighbouring veins in the choroid; and 3. More slender vessels, which were probably branches of the middle and posterior ciliary arteries.

The occurrence of a considerable bend in those vessels which passed from the broad rounded end of the figure to the narrower portion, and the deep shade in which the former lay when the latter was most brightly illuminated, showed that the broad round end lay in a deeper level than the narrower part in front; in other words, that the walls of the globe were more bulged there than they were in front, where their direction more nearly coincided with the general curve of the eyeball.

Vision.—With her left eye the child read No. 10 of Jager's test types slowly and hesitatingly, spelling the words letter by letter, but was unable to distinguish the lines of white mortar between the rows of bricks in a newly-pointed house, distant about twenty-five yards. The sight of the right eye was still more defective; she could not spell No. 20 with it, and could only count fingers at six inches. Neither + nor − lenses assisted either eye.

The field of vision of the left eye at eight inches' distance, with central fixation, had a horizontal diameter, through the fixing point, of twenty-five inches; its lower vertical radius was twelve and a half inches; and its general outline was that of a rude circle, from the upper hemisphere of which a large wedge had been cut out. This gap obviously corresponded in situation to the pear-like figure in the fundus oculi.

In this case the malformation existed in a maximum degree, the iris, ocular tunics, and opticus sheath retaining permanently the fissure natural to them at one period of their fœtal existence. The optic nerve, together with an intercalary membrane produced the ophthalmoscopic white, pear-like figure. Microscopical examination alone would suffice to determine positively all the elementary tissues of which this silvery membrane was composed; from the resemblance of its colour and reflection to those of the sclerotic, we infer that it consisted in part of connective tissue, identical with that of this coat; the absence of the pigment-epithelium, and the insensibility to light, show that the choroid and retina, in their completeness, were absent; whilst the passage of vessels from the intercalary membrane to the choroid, and across it from the optic nerve to the retina, prove the existence of some elements of these two inner tunics.

IV.—TWO CASES OF CONICAL CORNEA, KERATO-CONUS, TREATED BY IRIDODESIS.

The following cases aptly illustrate the beneficial results of this operation in this affection, a method of treatment described by Mr. Bowman in the 9th Number of this Journal (Old Series), pp. 154—167.

In both cases I was satisfied with the result of the first operation, and did not practise a second iridodesis in the opposite direction to the first, as was done in some of Mr. Bowman's patients, the pupils in my cases being spindle-shaped, and not elliptical. I opened the anterior chamber at its lowest point, so as to have the axis of the new pupil vertical; and I adopted Pagenstecher's modification of Critchett's original plan, commencing the puncture, through which the iris is drawn out, in the sclerotic about half a line from the anterior margin of the cornea, in order to avoid moving the plane of the iris away from the lens. In both cases vision was very considerably improved.

1.—*Conical Cornea of the left Eye.*

Mary Ann K., æt. 26, a nursemaid of healthy appearance, was admitted under my care April 19, 1861. In February 1860 she had had ague, and in the summer of that year her left eye was red, but she was not aware of any defect in its vision. In the following September she had slight cough, and spitting of blood; she told me that when 13 years old she had been considered consumptive. Two months before her admission into the hospital the left eye occasionally ached, and, on closing the other eye, she discovered that its sight was very confused.

Present state.—Marked conicity of the left cornea, confined to the central region, the curve of the periphery being, well as I could judge, unaltered. The apex of the cone is faintly nebulous. At eight inches' distance she reads No. 20 slowly and with hesitation, and at seven inches' distance No. 19. At two feet she counts fingers with uncertainty; but a concave lens of eight inches focal length enables her to count them correctly at seven feet. The right eye is perfectly healthy.

Iridodesis was performed directly downwards, and the circular pupil converted into a narrow spindle-shaped slit, the round upper end of which lay opposite the apex of the cone, and the pointed extremity at the sclero-corneal puncture.

On the fourth day, the ligature not having fallen off, I pulled it away. There was merely a slight redness, quite confined to the neighbourhood of the puncture. No. 19 is read easily at twenty-eight inches' distance. Three days after this she returned to the country, reading No. 10 at four inches' distance, and No. 19 at twenty-eight inches with ease and readiness.

2.—*Double Conical Cornea.*

Susannah H., æt. 22, a dwarfed, stunted woman, in weak health, was admitted under my care, July 1861. Three years previously she first noticed her sight becoming defective.

Present condition.—Marked conicity of both corneæ. With the *left* eye she spells words in No. 2 at from two and a half to three and a half inches' distance, and with a stenopaic spectacle at four and a half inches' distance; words in No. 20 at nine inches, and with a stenopaic spectacle at nineteen inches' distance.

With the *right* eye she reads No. 10 with difficulty at two and a half inches' distance, and with a stenopaic spectacle at five inches; No. 19 at three and a half inches, and with a stenopaic spectacle at fourteen inches.

A vertical spindle-shaped pupil was made by iridodesis downwards in the right eye. A fortnight afterwards she read No. 4 quickly at four inches' distance.

Nov. 19.—A similar operation was practised on the left eye.

Jan. 15, 1862.—With the left eye she reads No. 2 easily at six inches' distance, and No. 23 at seventeen feet; with the right eye she reads No. 2 at six inches with pains, and slowly, and No. 23 at fourteen feet.

V.—CASES OF CONGENITAL CATARACT TREATED BY IRIDODESIS.*

The treatment of congenital opacities, limited to the nucleus, by displacement of the pupil from opposite the opacity to the transparent margin of the lens, by the operation of iridodesis, is so novel, that a sufficiently large number of cases are yet wanting from which to draw reliable conclusions respecting the value of the method and the forms of opacity to which it is best suited. This reason induces me to add the following three cases to the general fund:—

Sept. 10, 1861, three brothers, respectively aged 12, 10, and 2 years and 9 months, were brought to me at the Royal London Ophthalmic Hospital with nuclear congenital cataracts in both eyes; the two elder I treated by iridodesis, the youngest I have not yet operated on. From their mother I learned that her own eyes, her husband's, and those of her other children were healthy. The three boys were rather undersized and delicate, but showed no symptoms of any inherited constitutional taint, as, for instance, of struma or syphilis. The two elder brothers had fallen into an awkward habit of keeping their faces turned towards one or

* For an account of this operation see papers by Mr. Critchett, Vol. I. p. 220, and No. 10, p. 145, and by Dr. Pagenstecher, A. f O. Vol. III. Part I. p. 193.

other shoulder, from their being unable to see distinctly objects lying straight before them, and when told to read with their heads straight, they held the test types sideways, and looked slantingly at them. The reason of this was obviously the obstruction of rays incident upon the opaque nucleus of the lens from objects lying about the visual axis, in consequence of which no images of these objects were formed upon the retina; whilst rays incident upon the clear periphery of the lens, and cutting the optic axis at a considerable angle, were transmitted and brought to foci at the bacillary layer. The pupils were active, and, excepting the lenticular opacity, the eyes were sound.

The iridodeses were practised at the inner side, and in five instances produced narrow spindle-shaped pupils; in the fourth the pupil was larger, balloon-shaped, and it will be seen that here the result was less perfect than in the other three.

Case 1.

Wm. Ch. D., æt. 12. *Right eye.* Nuclear opacity of lens, polygonal rather than circular in outline, and having a diameter rather less than $\frac{1}{3}$rd the diameter of the whole lens. The opacity is densest at the centre, where it has a fibrous, satin-like character; peripherally it is dull and horny, and can be seen into for a certain depth. Reads No. 4 at 4 inches' distance. *Left eye.* A nuclear opacity similar to that in the right eye, but rather more extensive, its diameter slightly exceeding $\frac{1}{3}$rd of the diameter of the entire lens. The anterior pole is marked by a triangular satiny stigma, which is sharply defined from the surrounding more pearly portion. Reads No. 2 at 4 inches' distance.

After the operation he was able to read No. 1 at 6 inches' distance, No. 21 at 7 feet, No. 22 and No. 23 at 20 feet with both eyes.

Case 2.

G. H. D., æt. 10. *Right eye.* A finely dotted opacity of the nucleus, its breadth equalling $\frac{1}{3}$rd the diameter of the entire lens. Reads No. 6 at 6 inches' distance. *Left eye.* A denser and more uniform opacity of the nucleus, but of $\frac{1}{3}$rd less extent than in the right eye. Reads No. 2 at 6 inches' distance.

After the operation, he could read with the right eye No. 6 at 6 inches, and No. 21 at 7 feet; with the left, No. 1 at 4 inches' distance, and No. 21 at 5 feet; with both No. 22 at 15 feet, and No. 23 at 20 feet.

Case 3.

A healthy-looking country girl, æt. 17, came under my care at the Royal London Ophthalmic Hospital, Sept. 17, 1861, with

congenital opacity of the nucleus of the lens in each eye rather less extensive than in the two preceding cases, (the breadth equalling $\frac{1}{4}$th the entire diameter of the lens,) but closely identical in textural character. There was, however, this difference—in the right eye, from the lower half of the sharp circumference of the opaque nucleus, four brushes of striæ radiated, one nearly reaching the margin of the lens; there were two similar brushes in the left lens. The eyes were otherwise sound. With the left she spelled No. 16 slowly, letter by letter, and with the right eye No. 20 at about 6 inches' distance in the same manner. The week after the operation, when she returned home, she read No. 6 at 8 inches' distance with either eye.

In each of these three cases the iridodeses were practised at the inner side. In the girl, in both eyes of the elder, and in the left eye of the younger brother small spindle-shaped pupils were obtained, but in his right eye the pupil was balloon-shaped, and nearly three times larger than the other. It will have been seen that, in the girl and the elder brother, near vision was much improved; whilst in the younger, the improvement was slight in the left, and nul in the right eye, which is explainable by the larger size of its pupil.

VI.—CASE OF ABSCESS OF THE FRONTAL SINUS.

In No. 14, Old Series, and No. 1, New, in a paper on diseases of the Frontal Sinus, I published five cases of abscess and distension of this cavity by accumulated mucus; to these I have now to add a sixth case which has recently come under my care. (For the early history I am indebted to Dr. H. Jackson, who had charge of the patient under my late colleague, Mr. Poland.)

Robert F., æt. 18, was admitted into the Royal London Ophthalmic Hospital, March 28, 1861, with a swelling on the left side of the forehead. His health had always been delicate, he had on several occasions had ear-ache attended by discharge, and during about two and a half years had had headache, principally about his forehead. Six months before his admission he had had some affection of the eye (he called it a cold), which was shortly followed by the swelling of the frontal bone, and the bursting of an abscess through the upper lid. At the time of his admission, the left half of the frontal bone, chiefly over the frontal sinus, seemed enlarged. The enlargement was uniform, without any nodosity of the surface, and it did not implicate the nasal bones, nor the nasal process of the superior maxilla. Matter was still issuing from a fistula situated just above the upper eyelid, between it and the eyebrow, opposite the supra orbital notch. Under treatment by iodide of potassium the swelling

gradually subsided, and after eight months the fistula closed. Before long a new opening formed in the forehead, a little above the root of the nose, just to the left of the median line. The discharge from this was at first puriform and very offensive, it slowly became less fœtid, thinner, and less abundant, and now, January 18th, 1862, a few drops escape at night only. The orifice in the bone is nearly circular, about 3 lines in diameter. A probe passes through it directly into the left frontal sinus, but cannot be made to enter the right. The left half of the forehead is rather flatter than the right, and the hollow above the superciliary ridge is deeper, as if from falling in of the anterior wall of the sinus. There is now a total absence of headache or any uneasiness in the forehead.

ON THE ADVANTAGES OF HAVING EYE-INSTRUMENTS GILT (ESPECIALLY SOME OF THOSE EMPLOYED IN IRIS-OPERATIONS), WITH A NOTE CONCERNING NON-METALLIC INSTRUMENTS.

By Mr. Streatfeild.

Occasionally we may see an instrument used in ophthalmic surgery that has been gilt, but this distinction seems to have been without any other purpose than that of ornament. No one eye instrument, that I know of, is *always* gilt,* nor is any one *class* of instruments commonly thus distinguished, but there are practical advantages in having a gold surface, to some of them at least, that I have learnt not to neglect. The first instrument I have had gilt was my spatula-hook, for in the operation of corelysis, when the instrument, passed behind the pupil, is in apposition with the lens, it is not easy to tell, and it is so much the more important to know the exact position of the instrument and the direction it is made to take.† I found, as I expected, that in using this instrument it enabled me to see better what I did in all that I had to perform. Then I had an iris-hook gilt, and, for the operation in which it was employed, I again found the advantage of the yellow metal, and now I intend to have the cannula-forceps and scissors and other iris instruments coated in the same manner. I am inclined to think that at least all

* Unless it is the director for the operation of "slitting up" the canaliculus; the *probes* that accompany it should rather be gilt, for a practical purpose, because, left in the nasal duct, they often become blackened.

† *See* Vol. II., p. 324.

instruments used for operating on parts within the eye should be gilt—the cutting instruments may be an exception—but of those that can be gilt the lighter colour will make them much to be preferred to the dark polished surface of steel. In an operation, there are two reasons why a steel instrument is not easily seen in the eye—it is so dark that, in the anterior chamber, it probably does not contrast well with the colour of the iris, and it has so smooth a polish that, in the deeper parts of the eye, it does not generally reflect enough light. In the aqueous chambers its highly polished surface reflects the light very strongly from some one part or another of the instrument (it is not always easy to tell whence it comes), or the instrument cannot be well seen because the light is hardly at all reflected from it. A surface of gold is perfect with a much less degree of polish, for it will not rust, which is another especial advantage for eye instruments, because of the tears and other watery fluids with which they are brought into contact; for this reason, eye instruments generally, being so small, would be kept in better order if they were gilt. Steel, even with care, will rust if there is any want of smoothness on its surface. Dull gold, on an instrument of polished steel, will show light whichever way the instrument is held.

I do not know why any small blunt instruments which we employ should be always of steel or any other metal, and therefore, wishing to have a spatula-hook to be as conspicuous as possible in contrast with the iris and its brown adhesions, I have had one made of ivory, and although it is so very small it is tough, and very little strength is required in it, as, for other reasons, no force may be used in the detachment of iris adhesions. In corelysis lately, I have employed this instrument, and have found it practically answer my purpose better than any other that I have of metal.

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